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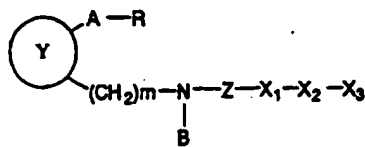
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EP 유럽특허 : 오스트리아 벨기에 스위스 리히텐슈타인 사이프러스 독일 덴마크 스페인 핀란드 프랑스 영국 그리스 아일랜드 이탈리아 룩셈부르크 모나코 네덜란드 포르투갈 스웨덴
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국내특허 : 알바니아 오스트레일리아 바베이도스 불가리아 브라질 캐나다 중국 체코 에스토니아 헝가리 이스라엘 아이슬란드 일본 대한민국 스리랑카 라이베리아 리투아니아 라트비아 마다가스카르 마케도니아 몽고 멕시코 노르웨이 뉴질랜드 슬로베니아 슬로바키아 터키 트리니다드토바고 우크라이나 미국 우즈베키스탄 베트남 폴란드 루마니아 싱가포르 그루지야
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심사청구 : 없음

(54) 비사이클릭 아미노 유도체 및 이들을 함유하는 프로스타글란딘 D₂ 길항제

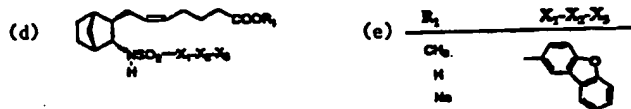
요약

하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물(예를 들면, (e)의 조건을 갖는 (d) 화합물)은 프로스타글란딘 D₂ (PGD₂)의 길항제로서 유용하고, 비만 세포의 기능 부전을 포함하는 질병(예: 전신성 비만 세포증, 과민성 비만 세포 활성화 증후군) 및 관련 증상(예: 알레르기성 비염, 알레르기성 결막염, 두드러기, 천식)



상기 식에서,

(a)는 (b) 또는 (c)이다.



명세서

기술분야

본 발명은 비사이클릭 아미노 유도체 및 이들을 함유한 프로스타글란딘 D₂(본원 이하에서는 PGD₂로 지칭)에 관한 것이다.

배경기술

본 발명의 일부 비사이클릭 아미노 유도체는 트롬복산 A₂ (TXA₂) 길항제로서 유용하다고 공지되어 있다(일본 특허 공고 공보 제 93-79060 호 참고). 그러나, 일본 특허 공고 공보 제 93-79060호에서는 상기 화합물이 TXA₂ 길항제로 유용하다고만 기술되어 있고, 본 발명에서 개시하는 바와 같이 PGD₂ 길항제로서의 그의 유용함을 제안하고 있지는 않다.

즉, TXA₂는 혈소판 응집 반응, 혈전 형성 등에 대한 작용과 같은 활성을 갖고 있다고 공지되어 있다. 따라서 TXA₂ 길항제는 항혈전제로서 유용하고, 또한 TXA₂에 대한 길항 작용에 의한 심근 경색 또는 천식의 치료에 유용하다고 생각되어 왔다.

한편, 본 발명의 PGD₂ 길항제는 PGD₂의 과도한 생성으로 인한 상태를 개선시키는데 유용하다. 특히, 비만 세포의 기능 부전을 포함하는 질병(예 : 전신성 비만 세포증 및 전신성 비만 세포 활성화의 장애) 및 기관 수축, 천식, 알러지성 비염, 알러지성 결막염, 두드러기, 허혈성 재관류로 인한 손상 및 염증의 치료용 약제로서 유용하다.

상기에서 알 수 있듯이, TXA₂ 길항제 및 PGD₂ 길항제는 활성 부위, 작용 메카니즘 및 용도에 있어서 서로 완전히 상이하고, 매우 상이한 특성을 갖는다. 따라서, 임의의 화합물이 이러한 활성을 동시에 소유하는 것은 예상하지 못했다.

PGD₂는 면역성 또는 비면역성 자극에 의해 활성화되는 사이클로옥시제네이스의 작용에 의해 아아라키돈산으로부터 PGG₂ 및 PGH₂를 거쳐 제조되며, 비만 세포로부터 생성되고 방출되는 중요한 프로스타노이드이다.

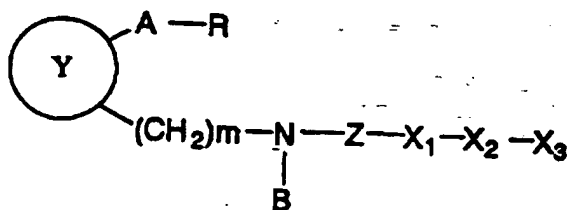
PGD₂는 강력한 여러 생리학적 및 병리학적 활성을 갖는다. 예를 들어, PGD₂는 심한 기관 수축의 원인이 되어 기관지 천식을 유발하기도 하고, 전신 알러지 상태에서 말초 혈관으로 퍼져 과민성 쇼크를 유발하기도 한다. 특히 PGD₂가 알러지성 비염에서 코 폐색의 개시에 원인이 되는 뜻밖의 물질중의 하나라는 생각에 보다 많은 주의가 집중되어 왔다. 따라서, 코 폐색증을 감소시키기 위한 약제로서 PGD₂ 또는 PGD₂ 수용체의 길항물질의 생합성에 대한 억제제를 개발하는 것이 제안되었다. 그러나, PGD₂ 생합성의 억제제는 가능하게는 다른 생물체에서의 프로스타글란딘의 합성에 상당한 영향을 미치며, 따라서 PGD₂ 수용체에 특이적인 길항제(차단제)를 개발하는 것이 바람직하다.

[발명의 요약]

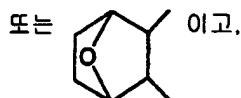
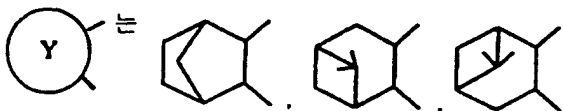
본 발명자들은 PGD₂ 수용체에 특이적인 PGD₂ 수용체 길항제(차단제)를 개발하는 것에 대해 집중 연구하여, 하기 화학식 I의 화합물 또는 그의 염이 PGD₂ 수용체 길항제로서 강력한 활성을 가지며 화학적 및 생화학적 으로 안정함을 발견하였다.

따라서, 본 발명은 활성 성분으로서 하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물을 포함하는 PGD₂ 길항제를 제공한다:

[화학식 I]



상기 식에서,



A는 선택적으로 쇠중에 헤테로 원자 또는 페닐렌을 함유하고, 옥소기를 함유하고/ 함유하거나, 불포화 결합을 갖는 알킬렌이고;

B는 수소, 알킬, 아르알킬 또는 아실이고;

R는 COOR₁, CH₂OR₂ 또는 CON(R₃)R₄이고;

R₁은 수소 또는 알킬이고;

R₂는 수소 또는 알킬이고;

R₃ 및 R₄는 각각 독립적으로 수소, 알킬, 하이드록시 또는 알킬설폰일이고;

X₁은 단일 결합, 페닐렌, 나프틸렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고;

X₂는 단일 결합, -N=N-, -N=CH-, -CH=N-, -CH=N-N-, -CH=N-O-, -C=NNHCSNH-, -C=NNHCONH-, -CH=CH-, CH(OH)-, -C(C1)=C(C1)-, -(CH₂)_n, 에틴일렌, -N(R₅)-, -N(R₅₁)CO-, -N(R

₅₂)SO₂-, -N(R₅₃)CON(R₅₄)-, -CON(R₅₅)-, -SO₂N(R₅₆)-, -O-, -S-, -SO-, -SO₂-, -CO-, 옥사디아졸디일, 티아디아졸디일 또는 테트라졸디일이고;

X₃은 알킬, 알켄일, 알킨일, 아릴, 아르알킬, 헤테로사이클릭 기, 사이클로알킬, 사이클로알켄일, 티아졸리닐리덴메틸, 티아졸리닐리덴메틸, -CH=NR₆ 또는 -N=C(R₇)R₈이고;

R₅, R₅₁, R₅₂, R₅₃, R₅₄, R₅₅ 및 R₅₆은 각각 수소 또는 알킬이고;

R₆은 수소, 알킬, 하이드록시, 알콕시, 카바모일옥시, 티오카바모일옥시, 우레이도 또는 티오우레이도이고;

R₇ 및 R₈은 각각 독립적으로 알킬, 알콕시 또는 아릴이고;

n은 1 또는 2이고;

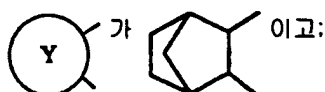
Z는 -SO₂- 또는 -CO-이고;

m은 0 또는 1이며;

이때, 사이클릭 치환체는 니트로, 알콕시, 설퍼모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알킬시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, -N=PPh₃, 옥소, 티옥소, 하이드록시이미노, 알콕시이미노, 페닐 및 알킬렌디옥시로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가질 수도 있다.

발명의 상세한 설명

PGD₂ 길항제로서 사용할 수 있는 화합물의 구체적인 예로는,



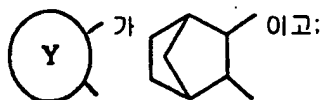
m이 0이고;

Z가 SO₂이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 알킬, 페닐, 나프틸, 스티릴, 퀴놀릴 또는 티엔알인(이들 치환체중 사이클릭 치환체는 선택적으로 니트로, 알콕시, 치환된- 또는 비치환된-아미노, 할로겐, 알킬 및 하이드록시알킬로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가짐) 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 구체적인 예로는

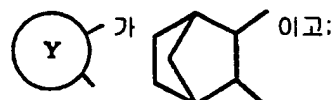


m 이 1이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 선택적으로 할로겐으로 치환된 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 구체적인 예로는



m 이 1이고;

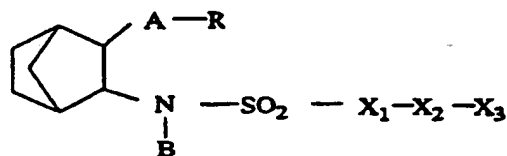
X_1 이 페닐이고;

X_2 가 $-\text{CH}_2-$ 또는 $-\text{N}=\text{N}-$ 이고;

X_3 이 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 화학식 I의 화합물의 예로는 하기 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

[화학식 Ia]



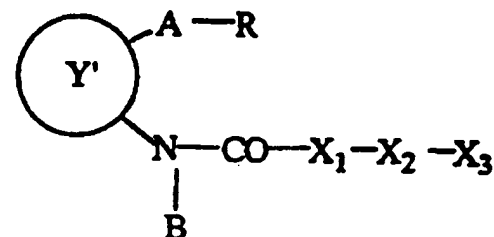
상기 식에서,

A, B, R, X_1 , X_2 및 X_3 은 화학식 I에 대하여 정의한 바와 같고,

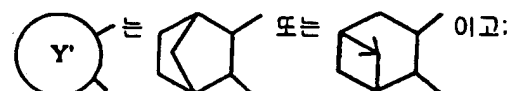
단, (1) X_1 및 X_2 가 단일 결합이고, X_3 이 치환된- 또는 비치환된-페닐 또는 나프틸인 경우와 (2) A가 5-헵텐일렌이고, R이 COOR_1 (이때, R_1 은 수소 또는 메틸임)이고, X_1 이 1,4-페닐렌이고, X_2 가 단일 결합이고, X_3 이 페닐인 경우를 제외한다.

유사하게, 화학식 I의 화합물의 예로는 하기 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물이 있다:

[화학식 Ib]



상기 식에서,



A, B, R, X_1 , X_2 및 X_3 은 화학식 I에 대하여 정의한 바와 같고,



단, X_1 및 X_2 가 단일 결합이고, X_3 이 페닐인 경우와 X_1 이 단일 결합이고, X_2 가 $-\text{O}-$ 이고, X_3 이 벤질인 경우를

보다 특징하게, 화학식 1의 화합물의 예로는 X_1 및 X_2 가 단일 결합이고 X_3 이 이중사슬릴, 티아디아졸릴, 이소티아졸릴, 모릴릴, 인돌릴, 벤조푸릴, 디벤조푸릴, 디벤조디옥신릴, 벤조티엔릴, 디벤조티엔릴, 카바졸릴, 크산텐릴, 페난트리딘릴, 디벤조세페닐, 디벤조티에핀릴, 시놀릴, 크로멘릴, 벤조이미다졸릴 또는 디하이드로벤조티에핀릴인 화학식 1a의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

유사하게, 화학식 I의 화합물의 예로는 R이 COOR₁이고, X₁이 페닐렌 또는 티오펜디일이고, X₂가 단일 결합, -N=N-, -CH=CH-, -CONH-, -NHCO- 또는 에틴일렌이고, X₃이 페닐, 티아졸린일리덴메틸, 티아졸리딘일리덴메틸 또는 티에일인 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

가

유사하게, 화학식 I의 화합물의 예로는 X_1 이 페닐렌 또는 티오펜디일이고, X_2 가 단일 결합, $-N=N-$, $-CH=CH-$, 에틸렌, $-O-$, $-S-$, $-CO-$, $-CON(R_{55})-$ (이때, R_{55} 는 상기 정의한 것과 같음), $-N(R_{51})CO-$ (이때, R_{51} 는 상기 정의한 것과 같음)이고, X_3 이 페닐인 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.


 가
 

상기 화학식 Ia 또는 화학식 Ib의 화합물은 본 발명자들이 합성한 신규 화합물이다.

'알킬렌'이라는 용어는 C₁-C₉의 직쇄 또는 분지쇄 알킬렌(예: 메틸렌, 메틸메틸렌, 디메틸메틸렌, 메틸에틸메틸렌, 에틸렌, 트리메틸렌, 테트라메틸렌, 펜타메틸렌, 헥사메틸렌, 헵타메틸렌, 옥타메틸렌, 노나메틸렌 등)을 의미한다. 상기 에틸렌은 쇠중에 헤테로 원자(들)(산소, 황, 질소 원자 등) 또는 페닐렌(예: 1, 4-페닐렌, 1,3-페닐렌, 1,2-페닐렌 등)을 함유할 수 있고, 옥소기를 함유할 수 있고/있거나, 쇠중의 어느 위치에서도 하나 이상의 이중- 또는 삼중-결합을 가질 수 있다. 예로는, -(CH₂)₂-O-CH₂-, -(CH₂)₂-O-(CH₂)₂-, -(CH₂)₂-O-(CH₂)₃-, -(CH₂)₂-O-(CH₂)₄-, -(CH₂)₂-O-(CH₂)₅-, -(CH₂)₂-O-(CH₂)₆-, -(CH₂)₂-S-(CH₂)₂-, -(CH₂)

4-, $-\text{CH}_2-\text{N}(\text{CH}_3)-\text{CH}_2-$, $-\text{CH}_2-\text{NH}-(\text{CH}_2)_2-$, $-(\text{CH}_2)_2-\text{N}(\text{CH}_2\text{CH}_3)-(\text{CH}_2)_3-$, $-(\text{CH}_2)_2-1,4\text{-페닐렌}-\text{CH}_2-$, $-(\text{CH}_2)_2-\text{O}-1,3\text{-페닐렌}-\text{CH}_2-$, $-(\text{CH}_2)_2-\text{O}-1,2\text{-페닐렌}-\text{CH}_2-$, $-(\text{CH}_2)_2-\text{O}-1,4\text{-페닐렌}-\text{CH}_2-$, $-\text{CH}=\text{CH}-\text{S}-\text{CH}_2-1,4\text{-페닐렌}-\text{CH}_2-$, $-\text{CH}=\text{CH}-\text{S}-\text{CH}_2-1,3\text{-페닐렌}-(\text{CH}_2)_2-$, 2-옥소프로판렌-, 3-옥소펜타렌-, 5-옥소헥실렌-, 비닐렌-, 1-프로펜일렌-, 2-프로펜일렌-, 1-부텐일렌-, 2-부텐일렌-, 3-부텐일렌-, 1,2-부타디엔일렌-, 1,3-부타디엔일렌-, 1-펜텐일렌-, 2-펜텐일렌-, 3-펜텐일렌-, 4-펜텐일렌-, 1,2-펜타디엔일렌-, 1,3-펜타디엔일렌-, 1,4-펜타디엔일렌-, 2,3-펜타디엔일렌-, 2,4-펜타디엔일렌-, 1-헥센일렌-, 2-헥센일렌-, 3-헥센일렌-, 4-헥센일렌-, 5-헥센일렌-, 1,2-헥사디엔일렌-, 1,3-헥사디엔일렌-, 1,4-헥사디엔일렌-, 1,5-헥사디엔일렌-, 2,3-헥사디엔일렌-, 2,4-헥사디엔일렌-, 2,5-헥사디엔일렌-, 3,4-헥사디엔일렌-, 3,5-헥사디엔일렌-, 4,5-헥사디엔일렌-, 1,1-디메틸-4-헥센일렌-, 1-헵텐일렌-, 2-헵텐일렌-, 3-헵텐일렌-, 4-헵텐일렌-, 5-헵텐일렌-, 2,2-디메틸-5-헵텐일렌-, 6-헵텐일렌-, 1,2-헵타디엔일렌-, 1,3-헵타디엔일렌-, 1,4-헵타디엔일렌-, 1,5-헵타디엔일렌-, 1,6-헵타디엔일렌-, 2,3-헵타디엔일렌-, 2,4-헵타디엔일렌-, 2,5-헵타디엔일렌-, 2,6-헵타디엔일렌-, 3,4-헵타디엔일렌-, 3,5-헵타디엔일렌-, 3,6-헵타디엔일렌-, 4,5-헵타디엔일렌-, 4,6-헵타디엔일렌 또는 5,6-헵타디엔일렌-, 1-프로핀일렌-, 3-부틴일렌-, 2-펜틴일렌-, 5-헥신일렌-, 6-헵틴일렌-, $-(\text{CH}_2)-\text{CH}=\text{CH}-\text{O}-(\text{CH}_2)_2-$, $-\text{CH}_2-\text{S}-(\text{CH}_2)_3-$, $-\text{CH}_2-\text{시스}-\text{CH}=\text{CH}-1,2\text{-페닐렌}-\text{CH}_2-$, $-\text{CH}=\text{CH}-1,4\text{-페닐렌}-(\text{CH}_2)_2-$, -4-옥소-4,5-헥센일렌 등을 들 수 있다.

5

데실, 트리데실, 테트라데실, 펜타데실, 헥사데실, 헵타데실, 옥타데실, 노나데실, 이코실 등을 들 수 있다.

'아릴'이라는 용어는 C_6-C_{14} 의 모노사이클릭 또는 축합 고리기를 의미하고, 예로는 페닐, 나프틸(예: 1-나프틸, 2-나프틸), 안트릴(예: 1-안트릴, 2-안트릴, 9-안트릴), 페난트릴(예: 2-페난트릴, 3-페난트릴, 9-페난트릴), 플루오렌일(예: 2-플루오렌일) 등을 들 수 있다. 페닐이 특히 바람직하다.

'아르알킬'이라는 용어는 알킬중 임의의 치환가능한 위치에서 상기와 같이 정의한 알킬을 상기 아릴로 치환함으로써 형성된 기를 의미한다. 예로는 벤질, 페닐, 페닐프로필(예: 3-페닐프로필), 나프틸메틸(예: α -나프틸메틸), 안트릴메틸(예: 9-안트릴메틸), 페난트릴메틸(예: 3-페난트릴메틸) 등을 들 수 있다.

'아실'이라는 용어는 지방족 카복실산으로부터 유도된 C_1-C_9 의 아실을 의미하고, 예로는 포르밀, 아세틸, 프로피온일, 부틸릴, 발레릴 등을 들 수 있다.

'알킬설폰일'이라는 용어는 설폰일을 상기 알킬로 치환함으로써 형성된 기를 의미하고, 예로는 메틸설폰일, 에틸설폰일, 프로필설폰일 등을 들 수 있다.

'알켄일'이라는 용어는 C_2-C_{20} 의 직쇄 또는 분지쇄 알켄일을 의미하며 이는 하나 이상의 이중 결합을 함유하는 상기 알킬에 해당된다. 예로는 비닐, 1-프로펜일, 2-프로펜일, 1-부텐일, 2-부텐일, 3-부텐일, 1,2-부타디엔일, 1-펜텐일, 1,2-펜타디엔일, 2-헥센일, 1,2-헥사디엔일, 3-헵텐일, 1,5-헵타디엔일 등을 들 수 있다.

'알킨일'이라는 용어는 C_2-C_{20} 의 직쇄 또는 분지쇄 알킨일로서 하나 이상의 삼중 결합을 함유하는 상기 알킬에 해당된다. 예로는, 에틴일, 1-프로핀일, 2-프로핀일, 1-부틴일, 2-부틴일, 3-부틴일 등을 들 수 있다.

'헤테로사이클릭 기'란 고리상에 산소, 황 및/또는 질소 원자로 구성된 그룹에서 독립적으로 선택된 하나 이상의 헤테로 원자를 함유하는 5원 내지 7원의 사이클릭 고리를 의미하며, 선택적으로 임의의 치환가능한 위치에서 탄소 고리 또는 다른 헤테로사이클릭 기와 축합된다. 예로는, 피롤일(예: 1-피롤일, 3-피롤일), 인돌일(예: 2-인돌일, 3-인돌일, 6-인돌일), 카바졸일(예: 2-카바졸일, 3-카바졸일), 이미다졸일(예: 1-이미다졸일, 4-이미다졸일), 피라졸일(예: 1-피라졸일, 3-피라졸일), 벤즈이미다졸일(예: 2-벤즈이미다졸일, 5-벤즈이미다졸일), 인다졸일(예: 3-인다졸일), 인돌리진일(예: 6-인돌리진일), 피리달일(예: 2-피리달일, 3-피리달일, 4-피리달일), 퀴놀일(예: 8-퀴놀일), 이소퀴놀일(예: 3-이소퀴놀일), 아크리달일(예: 1-아크리달일), 페난트리딘일(예: 2-페난트리딘일, 3-페난트리딘일), 피리다진일(예: 3-피리다진일), 피리미딘일(예: 4-피리미딘일), 피라지일(예: 2-피라지일), 시놀린일(예: 3-시놀린일), 프탈라딘일(예: 5-프탈라딘일), 쿠나졸린일(예: 2-쿠나졸린일), 이속사졸일(예: 3-이속사졸일, 4-이속사졸일), 벤즈이속사졸일(예: 1,2-벤즈이속사졸-4-일, 2,1-벤즈이속사졸-3-일), 옥사졸일(예: 2-옥사졸일, 4-옥사졸일, 5-옥사졸일), 벤즈옥사졸일(예: 2-벤즈옥사졸일), 벤즈옥사디아졸일(예: 4-벤즈옥사디아졸일), 이소티아졸일(예: 3-이소티아졸일, 4-이소티아졸일), 벤즈이소티아졸일(예: 1,2-벤즈이소티아졸-3-일, 2,1-벤즈이소티아졸-5-일), 티아졸일(예: 2-티아졸일), 벤조티아졸일(예: 2-벤조티아졸일), 티아디아졸일(예: 1,2,3-티아디아졸-4-일), 옥사디아졸일(예: 1,3,4-옥사디아졸-2-일), 디하이드로옥사디아졸일(예: 4,5-디하이드로-1,2,4-옥사디아졸-3-일), 푸릴(예: 2-푸릴, 3-푸릴), 벤조푸릴(예: 3-벤조푸릴), 이소벤조푸릴(예: 1-이소벤조푸릴), 티엔일(예: 2-티엔일, 3-티엔일), 벤조티엔일(예: 1-벤조티엔일-2-일, 2-벤조티엔일-1-일), 테트라졸일(예: 5-테트라졸일), 벤조디옥솔일(예: 1,3-벤조디옥솔-5-일), 디벤조푸릴(예: 2-디벤조푸릴, 3-디벤조푸릴), 디벤즈옥세핀일(예: 디벤조[b,f]옥세핀-2-일), 디하이드로디벤즈옥세핀일(예: 디하이드로디벤조[b,f]옥세핀일-2-일), 크로엔일(예: 2H-크로엔-3-일, 4H-크로엔-2-일), 디벤조티에핀일(예: 디벤조[b,f]티에핀-3-일, 디하이드로디벤조[b,f]티에핀-3-일), 모폴린일(예: 1,4-모폴린-4-일), 페노티아딘일(2-페노티아딘일), 사이클로펜타티엔일(예: 사이클로펜타[b]티엔일-3-일), 사이클로헥사티엔일(예: 사이클로헥사[b]티엔일-3-일) 등을 들 수 있다.

'사이클로알킬'이라는 용어는 C_3-C_6 의 사이클릭 알킬을 의미하고, 예로는 사이클로프로필, 사이클로부틸, 사이클로펜틸, 사이클로헥실 등을 들 수 있다.

'사이클로알켄일'이라는 용어는 C_3-C_6 의 사이클릭 알켄일을 의미하고, 예로는 사이클로프로펜일(예: 1-사이클로프로펜일), 사이클로부텐일(예: 2-사이클로부텐-1-일), 사이클로펜텐일(1-사이클로펜텐-1-일), 사이클로헥센일(예: 1-사이클로헥센-1-일) 등을 들 수 있다.

'알콕시'라는 용어는 C_1-C_6 의 알콕시를 의미하고, 예로는 메톡시, 에톡시, n-프로콕시, i-프로콕시, n-부톡시 등을 들 수 있다.

'치환된- 또는 비치환된-아미노'라는 정의에 있어서 치환된 아미노의 예로는 단일- 또는 이-치환된 아미노(예: 메틸아미노, 에틸아미노, 디메틸아미노, 사이클로헥실아미노, 페닐아미노, 디페닐아미노) 또는 사이클릭 아미노(예: 피페리디노, 피페라디노 또는 모폴리노)를 들 수 있다.

'아실옥시'라는 용어는 상기 '아실'로부터 유도된 아실옥시를 의미하고, 예로는 아세틸옥시, 프로피온일옥시, 부틸릴옥시, 발레릴옥시 등을 들 수 있다.

'할로겐'이라는 용어는 불소, 염소, 브롬 및 요오드를 의미한다.

'알콕시카보닐'이라는 용어는 상기 '알콕시'로부터 유도된 알콕시카보닐 기를 의미하고, 예로는 메톡시카보닐, 에톡시카보닐, 페닐옥시카보닐 등을 들 수 있다.

'아르알킬옥시카보닐'이라는 용어는 상기 '아르알킬'로부터 유도된 아르알킬 옥시카보닐 기를 의미하고, 예로는 벤질옥시카보닐, 페닐옥시카보닐 등을 들 수 있다.

'아릴옥시카보닐'이라는 용어는 상기 '아릴'로부터 유도된 아릴옥시카보닐기를 의미하고, 예로는 페닐옥시

카보닐, 나프틸옥시카보닐 등을 의미한다.

'알켄일옥시'라는 용어는 상기 '알켄일'로부터 유도된 알켄일옥시기를 의미하고, 예를 들면 비닐옥시, 1-프로펜일옥시, 2-부텐일옥시 등을 들 수 있다.

'하이드록시알킬'이라는 용어는 상기 '알킬'로부터 유도된 하이드록시알킬기를 의미하고, 예로는 하이드록시메틸, 하이드록시에틸, 하이드록시프로필 등을 들 수 있다.

'알킬티오'라는 용어는 상기 '알킬'로부터 유도된 알킬티오기를 의미하고, 예로는 메틸티오, 에틸티오, 프로필티오 등을 들 수 있다.

'알킬렌디옥시'라는 용어는 C₁-C₃의 알킬렌디옥시를 의미하고, 예로는 메틸렌디옥시, 에틸렌디옥시, 프로필렌디옥시 등을 들 수 있다.

'페닐렌', '나프틸렌', '티오펜디일', '인돌디일', '옥사졸디일', '옥사디아졸디일' 및 '테트라졸디일'의 경우, 상기 기는 임의의 두 치환가능한 부위에서 이웃하는 기에 결합될 수 있다.

상기 정의에서, 치환체가 사이클릭인 경우, 니트로, 알콕시, 설파모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알콕시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, N=PPh₃, 옥소, 티옥소, 하이드록시이미노, 알콕시이미노, 페닐 및 알킬렌디옥시중에서 선택된 1 내지 3개의 치환체로 치환될 수도 있다. 치환체는 고리상의 임의의 치환가능한 위치에 결합될 수도 있다.

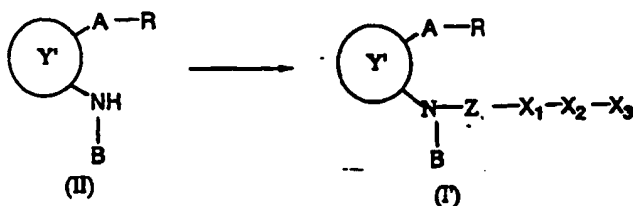
화학식 I의 염의 예로는 알칼리 금속(예: 리튬, 나트륨 또는 칼륨), 알칼리 토금속(예: 칼슘), 유기 염기(예: 트로메타민, 트리에틸아민, 트리메틸아민, 2-아미노부탄, t-부틸아민, 디이소프로필에틸아민, n-부틸에틸아민, 사이클로헥실아민, 디사이클로헥실아민, N-이소프로필사이클로헥실아민, 푸르푸랄아민, 벤질아민, 메틸벤질아민, 디벤질아민, N,N-디메틸벤질아민, 2-클로로벤질아민, 4-메톡시벤질아민, 1-나프틸렌에틸아민, 디페닐벤질아민, 트리페닐아민, 1-나프틸아민, 1-아미노안트라센, 2-아미노안트라센, 디하이드로아비에틸아민, N-메틸모폴린 또는 피리딘), 아미노산(예: 리신 또는 아르기닌) 등으로 형성된 염을 들 수 있다.

'수화물'이라는 용어는 화학식 I의 화합물 또는 그의 염의 수화물을 의미한다. 예로는 일- 및 이-수화물을 들 수 있다.

본 발명의 화합물은 화학식 I로 표현되고 입체 이성질체(예: 부분입체 이성질체, 에피머, 거울상 이성질체) 및 라세미 화합물의 임의의 유형을 포함한다.

화학식 I의 화합물 중, m=1인 화합물, 특히 하기 표 3b 및 3c에서 제시한 화합물은 일본 특허 공개 공보 제 90-180862호에서 기술된 공지의 화합물이다.

화학식 I의 화합물 중, m=0인 화합물(하기 일반식(I')로 표현된 화합물)은 하기 일반식(II)의 아미노 화합물을, 부분 구조가 하기 Z-X₁-X₂-X₃에 상응하는 설폰산 또는 카복실산의 반응성 유도체와 반응시켜 제조할 수 있다:



상기 식에서, A, B, R, X₁, X₂, X₃, Y 및 Z는 상기 정의한 것과 같다.

부분 구조가 Z-X₁-X₂-X₃에 상응하는 설폰산은 일반식 X₃-X₂-X₁-SO₂OH의 화합물이고, 상기 부분 구조에 상응하는 카복실산은 일반식 X₃-X₂-X₁-COOH의 화합물이다. 이러한 설폰산 또는 카복실산의 반응성 유도체는 상응하는 할라이드(예: 클로라이드, 브로마이드, 요오다이드), 산 무수물(예: 포스포산 또는 아세트산의 혼합된 산무수물), 활성 에스테르(예: 숙신이미드 에스테르)를 의미하고, 그 예로는 일반적으로 아미노기의 아실화에 사용되는 아실화제를 들 수 있다. 카복실산(X₃-X₂-X₁-COOH)은 아민과 카복실산의 축합 반응에서 사용되는 축합제(예: 디사이클로 헥실카보디이미드(DCC), 1-에틸-3-(3-디메틸아미노프로필)카보디이미드, N, N'-카보닐디이미드졸의 존재하에 이를 반응성 유도체로 변환시키지 않고 그대로 반응에 사용할 수 있다.

상기 반응은 아미노기의 아실화에 일반적으로 사용되는 조건하에서 수행될 수 있다. 예로는 할라이드 산을 사용하는 축합의 경우에, 에테르 용매(예: 디에틸에테르, 테트라하이드로푸란, 디옥산), 벤젠 용매(예: 벤젠, 톨루엔, 크실렌), 할로겐화된 탄화수소 용매(예: 디클로로메탄, 디클로로에탄, 클로로포름), 에틸 아세테이트, 디에틸포름아이드, 디메틸 설펍사이드, 아세트니트릴 등과 같은 용매를 사용하여, 필요하다면 염기(예컨대, 유기 염기(예: 트리에틸아민, 피리딘, N,N-디메틸아미노피리딘, N-메틸모폴린), 무기 염기(예: 나트륨 하이드록사이드, 칼륨 하이드록사이드, 칼륨 카보네이트 등))의 존재하에 실온에서, 냉각하면서 또는 바람직하게는 -20℃ 내지 냉각하의 온도에서 또는 실온 내지 반응계의 환류 온도에서 가열하면서, 수 분 또는 수 시간 동안, 바람직하게는 0.5 시간 내지 24시간, 보다 바람직하게는 1 시간 내지 12시간동안 수행된다.

다른 반응성 유도체 또는 유리 산과 아민(II)의 반응을 위한 반응 조건은 반응성 유도체 또는 유리 산의 각각의 특징에 따라 통상의 방식으로 결정할 수 있다.

반응 색소물은 통상의 적체 방법, 예를 들어, 용매로의 추출, 크로마토그래피, 재결정화 등에 의해 정제할 수

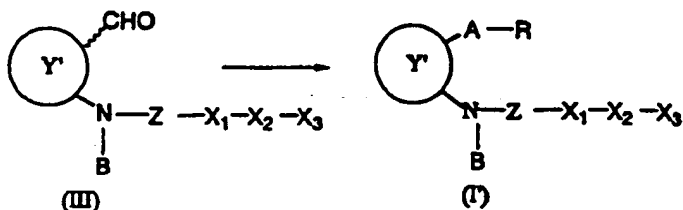
있다.

본 발명의 방법의 출발 물질인 화합물(II)의 구체적인 예는 다음과 같다. 3-아미노[2.2.1]비사이클릭 화합물의 예로는 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산, 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-2,2-디메틸-5-헵텐산, 7(N-메틸-3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산, 6-(3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산을 들 수 있다. 2-아미노-6,6-디메틸[3.1.1]비사이클릭 화합물의 구체적인 예로는 7-(2-아미노-6,6-디메틸비사이클로[3.1.1]헵트-3-일)-5-헵텐산을 들 수 있다. 이러한 출발 물질에서, 헵텐산 쇄를 포화시켜 헵탄산쇄를 형성할 수도 있고, 쇄중에 헤테로 원자(들) 또는 헤테로기(들)(예: -O-, -S-, -NH- 또는 페닐렌)를 포함할 수도 있고, 옥소기로 치환될 수도 있다. 이러한 화합물의 예로는 7-(3-아미노비사이클로[2.2.1]헵트-2-일)헵탄산, 4-(2-(2-아미노비사이클로[3.3.1]헵트-3-일)에톡시)페닐아세트산, 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-6-옥소-헵탄산을 들 수 있다. 이러한 출발 물질은 일본 특허 공보 제 93-79060 호 또는 제 91-23170호에 기술되어 있거나 또는 본원에 기술되어 있는 방법에 따라 제조할 수 있다.

상기 부분 구조($Z-X_1-X_2-X_3$)에 상응하는 설폰산(X_3-X_2-X

$1-SO_2OH$) 및 카복실산 ($X_3-X_2-X_1-COOH$)은 상기 X에 상응하는 치환체를 갖는 설폰산 또는 카복실산을 의미한다. 즉, 예로는 알칸-설폰산 또는 -카복실산, 알켄-설폰산 또는 -카복실산, 알킨-설폰산 또는 -카복실산, 사이클로알칸-설폰산 또는 -카복실산, 사이클로알칸-설폰산 또는 -카복실산, 아릴-설폰산 또는 -카복실산, 아르알킬옥시-설폰산 또는 -카복실산, 헤테로사이클릭 치환된-설폰산 또는 -카복실산, 헤테로아릴알킬-설폰산 또는 -카복실산 및 치환된-아미노-설폰산 또는 -카복실산을 들 수 있다. 설폰산 또는 카복실산은 각각 상기 치환체(들)를 가질 수도 있다. 이러한 설폰산 및 카복실산은 시판중이거나 또는 공지된 방법에 따라 공지된 화합물로부터 쉽게 합성할 수 있다. 반응하자마자, 설폰산 또는 카복실산은 필요한 경우, 상기 상응하는 반응성 유도체로 변환될 수 있다. 예를 들어, 산 할라이드가 필요한 경우, 문헌 [Shin-Jikken-Kagaku-Koza, vol. 14, 1787 페이지 (1978); Synthesis, 854-854(1986); Shin-Jikken-Kagaku-Koza, vol. 22, 115 페이지 (1992)]에서 기술하는 바와 같은 공지된 방법에 따라 화합물을 티온일 할라이드(예: 티온일 클로라이드), 인 할라이드(예: 삼염화인, 오염화인) 또는 옥살릴 할라이드(예: 옥살릴 클로라이드)와 반응시킨다. 다른 반응성 유도체 또한 공지된 방법으로 제조될 수 있다.

목적하는 화학식 I의 화합물중에서, 측쇄 A가 불포화 결합, 특히 이중 결합을 함유하는 화합물은 하기 일반식(III)의 알데하이드 유도체를 측쇄 A-R의 나머지 부분에 상응하는 일라이드 화합물과 비티히(Wittig) 반응 조건하에서 반응시켜 제조할 수 있다:



상기 식에서, A, B, R, X_1 , X_2 , X_3 , Y 및 Z는 상기 정의한 바와 같다.

출발 화합물(III)은 예를 들어 일본 특허 공개 공보 제 90-256650호에 기술된 방법에 따라 제조될 수 있다. 또한, 측쇄 A-R의 나머지 부분에 상응하는 일라이드 화합물은 트리페닐포스핀을 상응하는 할로겐화된 알칸산 또는 그의 에스테르 유도체, 에테르 유도체 또는 아마이드 유도체와 공지된 방법에 따라 염기의 존재하에서 반응시켜 합성할 수 있다.

목적하는 화학식 I의 화합물중에서, R이 COOH인 화합물은 바람직한 경우 상응하는 에스테르 유도체, 알콜 유도체, 에테르 유도체, 아마이드 유도체로 전환될 수 있다. 예를 들어, 에스테르 유도체는 카복실산을 중래의 방법으로 에스테르화하여 제조할 수 있다. 에스테르 유도체는 환원되는 경우, 알콜 유도체를 형성하고, 아마이드화되는 경우, 아마이드 유도체를 형성한다. 에테르 유도체는 알콜 유도체를 0-알킬화시켜 수득할 수 있다.

본 발명의 화학식 I의 화합물은 PGD₂ 수용체에 결합함으로써 시험관내에서 PGD₂에 대한 길항 효과를 나타내고, PGD₂의 과다한 생성으로 인한 비만 세포의 기능부전과 관련된 질병을 치료하기 위한 약제로서 유용하다. 예를 들어, 화학식 I의 화합물은 비만 세포의 기능 부전을 포함하는 질병의 치료용 약제로서 유용하다. 예를 들어, 화학식 I의 화합물은 전신성 비만 세포증 및 전신성 비만 세포 활성화의 장애 및 기관 수축, 천식, 알러지성 비염, 알러지성 결막염, 두드러기, 허혈성 재관류로 인한 손상 및 염증과 같은 질병을 치료하기 위한 약제로서 유용하다. 화학식 I의 화합물은 생체내에서 코의 폐색증에 대해 예방 효과를 보이고, 따라서 그를 치료하는 약제로서 특히 유용하다.

치료에 본 발명의 화학식 I의 화합물을 사용하는 경우, 화합물은 경구 및 비경구 투여를 위한 일반적인 제형으로 제형화될 수 있다. 본 발명의 화학식 I의 화합물을 함유하는 약학 조성물은 경구 및 비경구 투여를 위한 형태일 수 있다. 특히, 상기 화합물은 정제, 캡슐, 과립, 분말, 시럽 등과 같은 경구 투여용 제형; 및 정맥내, 근육내 또는 피하 주사용 주사 용액 또는 현탁액, 흡입제, 안약, 비강 점적, 좌제와 같은 비경구 투여용 제형; 또는 연고와 같은 경피 제형으로 제형화될 수 있다.

제형을 제조하는데 있어서, 당 분야의 일반적인 숙련자들에게 공지되어 있는 담체, 부형제, 용매 및 염기를 사용할 수도 있다. 정제의 경우, 보조 성분과 함께 활성 성분을 압착하거나 또는 배합함으로써 제조한다. 유용한 보조 성분의 예로는 결합제(예: 옥수수 전분), 충전제(예: 락토스, 미정질 셀룰로즈), 붕해제(예: 전분나트륨 글리콜레이트) 또는 윤활제(예: 마그네슘 스테아레이트)와 같은 약학적으로 허용가능한 부형제를 들 수 있다. 정제는 적절하게 피복될 수도 있다. 시럽, 용액 또는 현탁액과 같은 액체 제형의 경우, 현탁제(예: 메

메틸 (Z)-7-[(1S, 2R, 3R, 4R)-3-(2-디벤조푸릴)-설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 (1a-1) (234 mg, 0.50 mmol)를 메탄올(6mL)/테트라하이드로푸란(4mL)에 용해시켰다. 빙냉하에서 용액에 1N 칼륨 하이드록사이드 (1.50 mL, 1.50 mmol)를 첨가하였다. 반응 혼합물을 실온까지 가온한 다음, 16 시간 동안 반응시켜 농축시켜 용매를 제거하였다. 잔류물에 에틸 아세테이트(50 mL) 및 물 (10 mL)을 첨가하고, 그 다음 시키닝(2.00 mL, 0.90 mmol)을 첨가하여 유체를 얻었다. 유체를 진공으로 증발시켜, 1.5g의 흰색 고체 수득물(100%)을 얻었다.

IR (CHCl₃): 3266, 3026, 2952, 2874, 1708, 1465, 1443, 1423, 1319, 1267, 1245, 1153, 1121, 1104, 1072, 906 /cm.

¹H NMR(CDCl₃)δ: 0.93-1.94(14H,m), 2.12-2.19(1H,m), 2.26(2H,t, J=7.2Hz), 3.00-3.08(1H,m), 5.12-5.25(2H,m), 5.26(1H,d, J=6.6Hz), 7.38-7.45(1H,m), 7.51-7.70(3H,m), 7.87-8.13(2H,m), 8.54(1H, d, J=2.1Hz).

[α]_D²⁰ = +6.8° (CHCl₃, c=1.08 g, 23 °C).

(Z)-7-[(1S, 2R, 3R, 4R)-3-(2-디벤조푸릴)설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵텐산(1a-2) (453 mg, 0.97 mmol)을 메탄올 (5ml)에 용해시켰다. 1N 나트륨 메톡사이드/메탄올 (1.034 N, 0.937 ml, 0.97 mmol)을 첨가한 후, 혼합물을 실온까지 가온하고 1시간 동안 반응시켰다. 증류에 의해 용매를 제거하여, 나트륨염(1a-3) (457 mg, 0.933 mmol)을 수득하였다.

수율: 96%, 비정질 분말.

원소 분석 (C₂₆H₂₈NO₅Na 0.6H₂O)

계산치 (%) : C, 62.41; H, 5.88; N, 2.80; S, 6.41; Na, 4.59

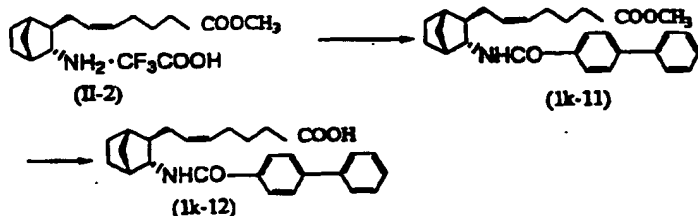
측정치 (%) : C, 62.45; H, 5.92; N, 2.99; S, 6.49; Na, 4.46

IR (KBr): 434, 3280, 3074, 3007, 2952, 2873, 1566, 1467, 1444, 1417, 1344, 1315, 1270, 1248, 1200, 1109, 1154, 1124, 1107, 1075, 1058, 895, 842, 818 /cm.

¹H NMR(CD₃OD)δ: 1.02-2.05(16H, m), 2.16-2.23(1H, m), 2.94-3.00(1H, m), 4.98-5.05(2H, m), 7.41-7.48(1H, m), 7.53-7.62(1H, m), 7.66(1H, d, J=8.4Hz), 7.77(1H, d, J=8.4Hz), 8.57(1H, d, J=2.1Hz).

[α]_D²⁰ = -15.2° (CH₃OH, c=1.07g, 22°C).

[실시예 2]



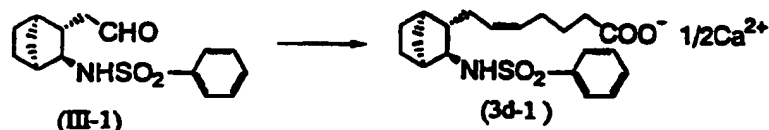
일본 특허 공고 공보 제 93-79060 호의 대조에 4에서 기술한 방법으로 제조한 메틸 (Z)-7-[(1S, 2R, 3R, 4R)-3-아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 트리플루오로아세테이트(II-2) (232 mg, 0.636 mmol)를 메틸렌 클로라이드(5 ml)에 용해시켰다. 빙냉하에서 이 용액에 트리에틸아민(0.279 ml, 2.00 mmol) 및 4-비페닐카보닐 클로라이드를 첨가하고, 동일 온도에서 7시간동안 교반하였다. 반응 혼합물을 실리카 겔상에서 칼럼 크로마토그래피(에틸 아세테이트/n-헥산 (1:4))에 의해 정제하여 (Z)-7-[(1S, 2R, 3R, 4R)-3-(4-비페닐)카보닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트(1k-11) (221 mg, 0.512 mmol)를 수득하였다. 화합물(1K-11) (190 mg, 0.440 mmol)을 메탄올 (6ml)에 용해시켰다. 빙냉하에서 용액에 1N KOH(1.10 ml, 1.10 mmol)를 첨가하고 실온에서 15시간동안 교반하였다.

진공하에서 반응 혼합물을 농축시켰다. 물 (20 ml) 및 1N HCl(2 ml)을 첨가한 후, 잔류물을 에틸 아세테이트로 추출하였다. 유기층을 포화 염수로 세척하고, 무수 나트륨 설페이트로 건조시킨 후, 농축시켰다. 잔류물을 실리카 겔상에서 칼럼 크로마토그래피(0.3% 아세트산을 함유하는 에틸 아세테이트/헥산 (1:1))에 의해 정제하여 (Z)-7-[(1S, 2R, 3R, 4R)-3-(4-비페닐)카보닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵텐산(1k-12) (172 mg, 0.412 mmol)을 수득하였다.

수율: 94%.

또한, 하기의 화합물을 하기의 방법으로 제조할 수 있다.

[실시예 3]



질소 분위기하의 실온에서 4-카복시부틸트리페닐포스포늄 브로마이드(14.8 g 33.3 mmol) 및 테트라하이드로푸란(80 ml)의 현탁액에 칼륨 3급-부티레이트 (7.55g, 67.3 mmol)를 첨가하였다. 실온에서 1시간 동안 교반한 후, 혼합물을 -20℃로 냉각시키고, 테트라하이드로푸란 (20ml)내 N-[(1S, 2S, 3S, 4R)-3-포르밀에틸비사이클로[2.2.1]헵트-2-일]벤젠설폰아미드(III-1) (일본 특허 공개 공보 제 90-256650 호, 대조예 2) (3.25 g, 11.1 mmol)를 천천히 첨가하였다. -20℃에서 약 1시간 동안 교반한 후, 냉용을 제거하고, 1시간 동안 추가로 혼합물을 교반하였다. 반응 용액에 2N HCl를 첨가하고, 혼합물을 에틸 아세테이트로 추출하고, 물 및 염수로 세척한 후 농축시켰다. 물루엔 및 1N 나트륨 하이드록사이드를 생성된 조질의 생성물에 첨가한 후 수성층을 분리하였다. 유기층을 물로 다시 세척하고, 세척액을 앞서 얻은 수성층과 합쳤다. 2N HCl를 첨가한 후, 수용액을 에틸 아세테이트로 추출하였다. 추출물을 물 및 염수로 세척하고, 나트륨 설페이트로 건조시킨 후 농축시켰다. 잔류물을 실리카 겔상에서 컬럼 크로마토그래피에 의해 정제하여 칼슘 (Z)-7-[(1R, 2S, 3S, 4S)-3-페닐설폰닐아미노비사이클로[2.2.1] 헵트-2-일]-5-헵테노에이트(1d-1) (3.29 g)를 수득하였다.

수율 : 79%, mp : 62℃.

원소 분석 : (C₂₀H₂₇NO₄S)

계산치 (%) : C, 63.63; H, 7.21; N, 3.71; S, 8.49

측정치 (%) : C, 63.56; H, 7.21; N, 3.83; S, 8.43

[α]_D²⁰ + 5.3 ± 0.5° (CHCl₃, c=1.003 g, 22℃)

[α]_D²⁰ + 27.1 ± 0.7° (NaOH, c=1.015 g 24℃)

IR(뉴클) 3282, 3260, 3300, 2400, 1708, 1268, 1248, 1202, 1162, 1153, 1095, 1076/cm.

¹H NMR δ 0.88-2.10(m, 14H), 2.14(br s, 1H), 2.34(t, J=7.2Hz, 2H),

2.95-3.07(m, 1H), 5.13-5.35(m, 3H), 7.45-7.64(m, 3H), 7.85-7.94(m,

2H), 9.52(br s, 1H).

상기 실시예에서 기술한 방법에 따라 제조된 화합물을 하기 표에 제시하였다.

표 1a

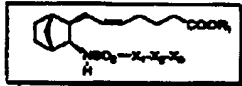
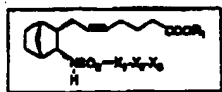
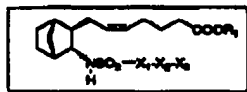
		
No.	R ₁	X ₁ -X ₂ -X ₃
1a-1	CH ₃	
1a-2	H	
1a-3	Na	
1a-4	CH ₃	
1a-5	H	
1a-6	CH ₃	
1a-7	H	
1a-8	CH ₃	
1a-9	H	
1a-10	CH ₃	
1a-11	H	
1a-12	CH ₃	
1a-13	H	
1a-14	CH ₃	
1a-15	H	
1a-16	CH ₃	
1a-17	H	
1a-18	CH ₃	
1a-19	H	
1a-20	CH ₃	
1a-21	H	
1a-22	H	
1a-23	H	

표 1a (계속)



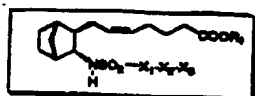
No.	R ₁	X ₁ -X ₂ -X ₃
1a-24	CH ₃	
1a-25	H	
1a-26	Na	
1a-27	CH ₃	
1a-28	H	
1a-29	Na	
1a-30	CH ₃	
1a-31	H	
1a-32	CH ₃	
1a-33	H	
1a-34	CH ₃	
1a-35	CH ₃	
1a-36	H	
1a-37	CH ₃	
1a-38	H	
1a-39	CH ₃	
1a-40	H	
1a-41	H	
1a-42	CH ₃	
1a-43	H	
1a-44	CH ₃	
1a-45	H	

표 1a (계속)



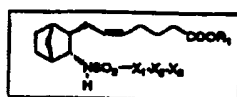
No.	R ₁	X ₁ -X ₂ -X ₃
1a-46	CH ₃	
1a-47	H	
1a-48	Na	
1a-49	CH ₃	
1a-50	H	
1a-51	CH ₃	
1a-52	H	
1a-53	CH ₃	
1a-54	H	
1a-55	CH ₃	
1a-56	H	
1a-57	CH ₃	
1a-58	H	
1a-59	CH ₃	
1a-60	H	
1a-61	CH ₃	
1a-62	H	
1a-63	CH ₃	
1a-64	H	
1a-65	CH ₃	
1a-66	H	
1a-67	CH ₃	
1a-68	H	

표 1a (계속)



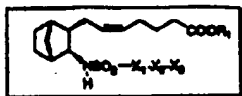
No.	R ₁	X ₁ -X ₂ -X ₃
1a-69	CH ₃	
1a-70	H	
1a-71	CH ₃	
1a-72	H	
1a-73	CH ₃	
1a-74	H	
1a-75	CH ₃	
1a-76	H	
1a-77	CH ₃	
1a-78	H	
1a-79	H	
1a-80	CH ₃	
1a-81	H	
1a-82	CH ₃	
1a-83	H	
1a-84	H	
1a-85	H	
1a-86	H	
1a-87	H	

표 1a (계속)



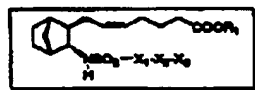
No.	R ₁	X ₁ -X ₂ -X ₃
1a-88	CH ₃	
1a-89	H	
1a-90	CH ₃	
1a-91	H	
1a-92	CH ₃	
1a-93	H	
1a-94	H	
1a-95	H	
1a-96	H	
1a-97	H	
1a-98	H	
1a-99	Na	

표 1a (계속)



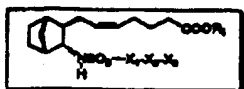
No.	R ₁	X ₁ -X ₂ -X ₃
1a-100	CH ₃	
1a-101	H	
1a-102	CH ₃	
1a-103	CH ₃	
1a-104	H	
1a-105	CH ₃	
1a-106	H	
1a-107	CH ₃	
1a-108	H	
1a-109	CH ₃	
1a-110	H	
1a-111	CH ₃	
1a-112	H	
1a-113	CH ₃	
1a-114	H	

표 1a (계속)



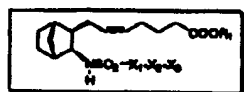
No.	R ₁	X ₁ -X ₂ -X ₃
1a-115	CH ₃	
1a-116	H	
1a-117	Na	
1a-118	Li	
1a-119	CH ₃	
1a-120	Na	
1a-121	H	
1a-122	CH ₃	
1a-123	H	
1a-124	CH ₃	
1a-125	CH ₃	
1a-126	H	
1a-127	CH ₃	
1a-128	H	
1a-129	CH ₃	
1a-130	CH ₃	
1a-131	H	
1a-132	CH ₃	
1a-133	H	
1a-134	H	
1a-135	CH ₃	
1a-136	H	
1a-137	CH ₃	
1a-138	H	
1a-139	CH ₃	
1a-140	H	

표 1a (계속)



No.	R ₁	X ₁ -X ₂ -X ₃
1a-141	CH ₃	
1a-142	H	
1a-143	H	
1a-144	H	
1a-145	H	
1a-146	H	
1a-147	H	
1a-148	H	
1a-149	H	
1a-150	H	
1a-151	H	

표 1a (계속)



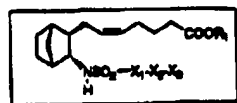
No.	R ₁	X ₁ -X ₂ -X ₃
1a-152	H	
1a-153	H	
1a-154	H	
1a-155	H	
1a-156	H	
1a-157	H	
1a-158	H	
1a-159	H	
1a-160	H	

표 1a (계속)



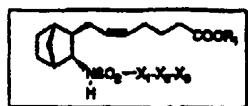
No.	R ₁	X ₁ -X ₂ -X ₃
1a-161	H	
1a-162	H	
1a-163	H	
1a-164	H	
1a-165	H	
1a-166	H	
1a-167	H	
1a-168	H	
1a-169	H	
1a-170	H	
1a-171	CH ₃	
1a-172	H	

표 1a (계속)



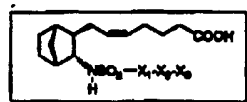
No.	R ₁	X ₁ -X ₂ -X ₃
1a-173	H	
1a-174	H	
1a-175	CH ₃	
1a-176	H	
1a-177	CH ₃	
1a-178	H	
1a-179	CH ₃	
1a-180	H	
1a-181	H	
1a-182	CH ₃	
1a-183	H	

표 1a (계속)



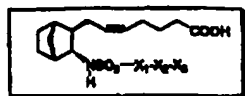
No.	R ₁	X ₁ -X ₂ -X ₃
1a-184	H	
1a-185	H	
1a-186	CH ₃	
1a-187	H	
1a-188	CH ₃	
1a-189	H	
1a-190	CH ₃	
1a-191	H	
1a-192	CH ₃	
1a-193	H	

표 1a (계속)



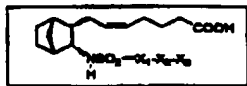
No.	X ₁ -X ₂ -X ₃
1a-194	
1a-195	
1a-196	
1a-197	
1a-198	
1a-199	
1a-200	
1a-201	
1a-202	
1a-203	

표 1a (계속)



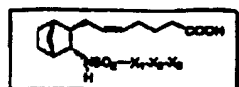
No.	$X_1-X_2-X_3$
1a-304	
1a-305	
1a-306	
1a-307	
1a-308	
1a-309	
1a-310	
1a-311	
1a-312	
1a-313	

표 1a (계속)



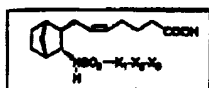
No.	$X_1-X_2-X_3$
1a-314	
1a-315	
1a-316	
1a-317	
1a-318	
1a-319	
1a-320	
1a-321	
1a-322	
1a-323	

표 1a (계속)



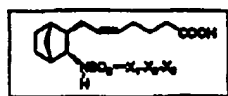
No.	X ₁ -X ₂ -X ₃
1a-234	
1a-235	
1a-236	
1a-237	
1a-238	
1a-239	
1a-240	
1a-241	
1a-242	
1a-243	
1a-244	
1a-245	

표 1a (계속)



No.	X ₁ -X ₂ -X ₃
1a-246	
1a-247	
1a-248	
1a-249	
1a-250	
1a-251	
1a-252	
1a-253	
1a-254	
1a-255	
1a-256	

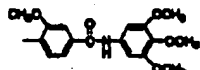
표 1a (계속)



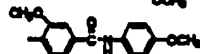
No.

X₁-X₂-X₃

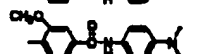
1a-347



1a-348



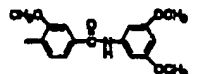
1a-349



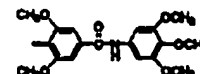
1a-350



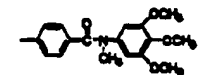
1a-351



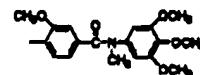
1a-352



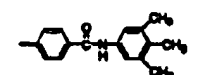
1a-353



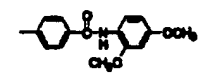
1a-354



1a-355



1a-356



1a-357

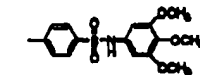
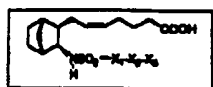
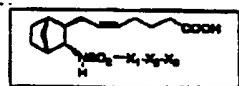


표 1a (계속)



No.	X ₁ -X ₂ -X ₃
1a-348	
1a-349	
1a-350	
1a-351	
1a-352	
1a-353	
1a-354	
1a-355	
1a-356	
1a-357	
1a-358	
1a-359	
1a-370	
1a-371	

표 1a (계속)



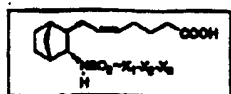
No.	X ₁ -X ₂ -X ₃
1a-372	
1a-373	
1a-374	
1a-375	
1a-376	
1a-377	
1a-378	
1a-379	
1a-380	
1a-381	
1a-382	
1a-383	

표 1a (계속)



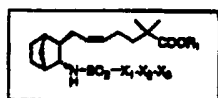
No.	X ₁ X ₂ X ₃
1a-284	
1a-285	
1a-286	
1a-287	
1a-288	
1a-289	
1a-290	
1a-291	
1a-292	
1a-293	
1a-294	

표 1a (계속)



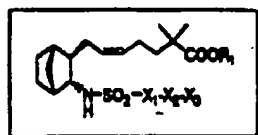
No.	$X_1-X_2-X_3$
1a-295	
1a-296	
1a-297	
1a-298	
1a-299	
1a-300	
1a-301	
1a-302	
1a-303	
1a-304	
1a-305	

表 1b



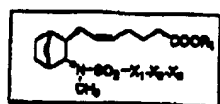
No.	R_1	$X_1-X_2-X_3$
1b-1	CH_3	
1b-3	CH_3	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1b (계속)



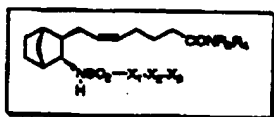
No.	R ₁	X ₁ -X ₂ -X ₃
1b-11	H	
1b-12	H	
1b-13	H	
1b-14	H	
1b-15	H	

표 1c



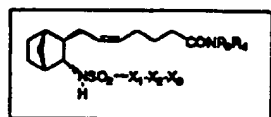
No.	R ₁	X ₁ -X ₂ -X ₃
1a-1	CH ₃	
1a-2	CH ₃	
1a-3	H	
1a-4	H	
1a-5	H	
1a-6	H	
1a-7	H	
1a-8	H	
1a-9	H	
1a-10	H	
1a-11	H	
1a-12	H	

II 1d



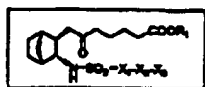
No.	R_2 - R_4	$X_1-X_2-X_3$
14-1	H SO_2CH_3	
14-2	H H	
14-3	H OH	
14-4	H SO_2CH_3	
14-5	H SO_2CH_3	
14-6	H SO_2CH_3	
14-7	H SO_2CH_3	
14-8	H SO_2CH_3	
14-9	H SO_2CH_3	
14-10	H SO_2CH_3	

표 1d (계속)



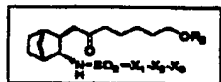
No.	R_2 - R_4	$X_1-X_2-X_3$
14-11	H SO_2CH_3	
14-12	H SO_2CH_3	
14-13	H SO_2CH_3	
14-14	H SO_2CH_3	
14-15	H SO_2CH_3	

표 1e



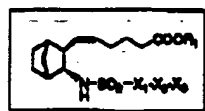
No.	R ₂	X ₁ -X ₂ -X ₃
1a-1	H	
1a-2	H	
1a-3	H	
1a-4	H	
1a-5	H	
1a-6	H	
1a-7	H	
1a-8	H	
1a-9	H	
1a-10	H	

II 1f



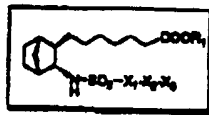
No.	R ₂	X ₁ -X ₂ -X ₃
1f-1	H	
1f-2	H	
1f-3	H	
1f-4	H	
1f-5	H	
1f-6	H	
1f-7	H	
1f-8	H	
1f-9	H	
1f-10	H	

II 1g



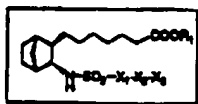
No.	R ₁	X ₁ -X ₂ -X ₃
1g-1	H	
1g-2	H	
1g-3	H	
1g-4	H	
1g-5	H	
1g-6	H	
1g-7	H	
1g-8	H	
1g-9	H	
1g-10	H	
1g-11	H	

표 1h



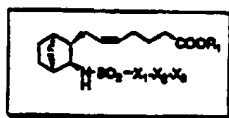
No.	R ₁	X ₁ -X ₂ -X ₃
1b-1	H	
1b-2	H	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1i



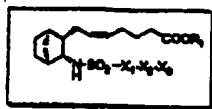
No.	R ₁	X ₇ -X ₈ -X ₉
1b-1	H	
1b-2	H	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1j



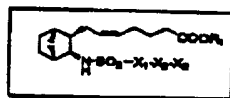
No.	R ₁	X ₇ -X ₈ -X ₉
1j-1	CH ₃	
1j-2	H	
1j-3	Na	
1j-4	H	
1j-5	CH ₃	
1j-6	CH ₃	
1j-7	H	
1j-8	CH ₃	
1j-9	CH ₃	
1j-10	H	
1j-11	CH ₃	
1j-12	H	
1j-13	CH ₃	
1j-14	H	
1j-15	CH ₃	
1j-16	H	

표 1j(계속)



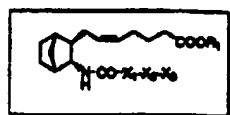
No.	R ₁	X ₁ -X ₂ -X ₃
1j-17	H	
1j-18	CH ₃	
1j-19	H	
1j-20	CH ₃	
1j-21	H	
1j-22	H	
1j-23	CH ₃	
1j-24	H	
1j-25	CH ₃	
1j-26	H	
1j-27	H	
1j-28	CH ₃	
1j-29	H	

표 1j(계속)



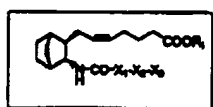
No.	R ₁	X ₁ -X ₂ -X ₃
1j-30	H	
1j-31	H	
1j-32	H	
1j-33	H	
1j-34	H	
1j-35	H	
1j-36	H	
1j-37	H	
1j-38	H	

표 1k



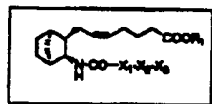
No.	R ₁	X ₁ -X ₂ -X ₃
1b-1	H	
1b-2	CH ₃	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	
1b-11	CH ₃	
1b-12	H	

표 1k (계속)



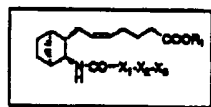
No.	R ₁	X ₁ -X ₂ -X ₃
1b-13	H	
1b-14	H	
1b-15	H	
1b-16	H	
1b-17	H	
1b-18	H	
1b-19	H	
1b-20	H	

표 1m



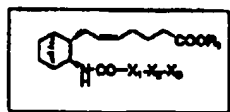
No.	R ₁	X ₁ -X ₂ -X ₃
1m-1	CH ₃	
1m-2	H	
1m-3	CH ₃	
1m-4	H	
1m-5	CH ₃	
1m-6	H	
1m-7	CH ₃	
1m-8	H	
1m-9	CH ₃	
1m-10	H	
1m-11	CH ₃	
1m-12	H	
1m-13	CH ₃	
1m-14	H	
1m-15	CH ₃	
1m-16	H	
1m-17	CH ₃	
1m-18	H	

표 1m (계속)



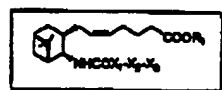
No.	R ₁	X ₁ -X ₂ -X ₃
1m-19	CH ₃	
1m-20	H	
1m-21	H	
1m-22	H	
1m-23	CH ₃	
1m-24	H	
1m-25	CH ₃	
1m-26	H	
1m-27	CH ₃	
1m-28	H	
1m-29	CH ₃	
1m-30	H	
1m-31	H	
1m-32	H	
1m-33	H	

표 1m (계속)



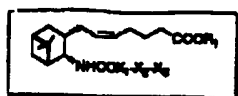
No.	R ₁	X ₁ -X ₅ -X ₆
1m-34	H	
1m-35	H	
1m-36	H	
1m-37	H	
1m-38	H	
1m-39	H	
1m-40	H	

표 2a



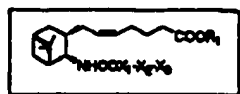
No.	R ₁	X ₁ -X ₅ -X ₆
2a-1	CH ₃	
2a-2	H	
2a-3	CH ₃	
2a-4	H	
2a-5	Me	
2a-6	CH ₃	
2a-7	H	
2a-8	CH ₃	
2a-9	H	
2a-10	CH ₃	
2a-11	H	
2a-12	CH ₃	
2a-13	H	
2a-14	CH ₃	
2a-15	H	
2a-16	CH ₃	
2a-17	H	
2a-18	CH ₃	
2a-19	H	
2a-20	CH ₃	
2a-21	H	
2a-22	Me	
2a-23	CH ₃	
2a-24	H	

표 2a (계속)



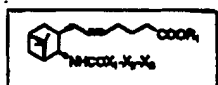
No.	R ₁	X ₁ -X ₂ -X ₃
2a-35	CH ₃	
2a-36	H	
2a-37	CH ₃	
2a-38	H	
2a-39	CH ₃	
2a-40	H	
2a-41	CH ₃	
2a-42	H	
2a-43	CH ₃	
2a-44	H	
2a-45	CH ₃	
2a-46	H	
2a-47	CH ₃	
2a-48	H	

표 2a (계속)



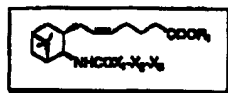
No.	R ₁	X ₁ -X ₂ -X ₃
2a-48	CH ₃	
2a-49	H	
2a-50	CH ₃	
2a-51	H	
2a-52	CH ₃	
2a-53	H	
2a-54	CH ₃	
2a-55	H	
2a-56	CH ₃	
2a-57	H	
2a-58	CH ₃	
2a-59	H	
2a-60	CH ₃	
2a-61	H	
2a-62	CH ₃	
2a-63	H	
2a-64	CH ₃	
2a-65	H	
2a-66	CH ₃	
2a-67	H	

표 2a (계속)



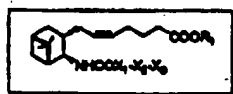
No.	R ₁	X ₁ -X ₂ -X ₃
2a-68	CH ₃	
2a-69	H	
2a-70	CH ₃	
2a-71	H	
2a-72	CH ₃	
2a-73	H	
2a-74	CH ₃	
2a-75	H	
2a-76	CH ₃	
2a-77	H	
2a-78	CH ₃	
2a-79	H	
2a-80	CH ₃	
2a-81	H	
2a-82	CH ₃	
2a-83	H	
2a-84	CH ₃	
2a-85	H	
2a-86	CH ₃	
2a-87	H	

표 2a (계속)



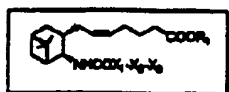
No.	R_1	$X_1-X_2-X_3$
2a-88	CH_3	
2a-89	H	
2a-90	CH_3	
2a-91	H	
2a-92	CH_3	
2a-93	H	
2a-94	CH_3	
2a-95	H	
2a-96	Na	
2a-97	Ca^{+2}	
2a-98	CH_3	
2a-99	H	
2a-100	CH_3	
2a-101	H	
2a-102	CH_3	
2a-103	H	
2a-104	CH_3	
2a-105	H	
2a-106	CH_3	
2a-107	H	
2a-108	CH_3	
2a-109	H	
2a-110	Na	
2a-111	CH_3	
2a-112	H	

표 2a (계속)



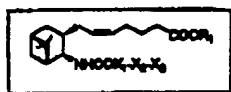
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-113	CH ₃	
2a-114	H	
2a-115	CH ₃	
2a-116	H	
2a-117	CH ₃	
2a-118	H	
2a-119	H	
2a-120	H	
2a-121	H	
2a-122	H	
2a-123	H	
2a-124	H	
2a-125	H	

표 2a (계속)



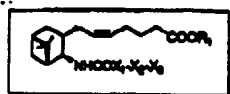
No.	R ₁	X ₁ -X ₂ -X ₃
2a-126	H	
2a-127	H	
2a-128	H	
2a-129	H	
2a-130	H	
2a-131	H	
2a-132	H	
2a-133	H	
2a-134	H	
2a-135	H	
2a-136	H	

표 2a (계속)



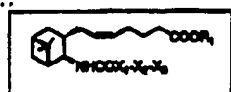
No.	R ₁	X ₁ X ₂ X ₃
2a-137	H	
2a-138	H	
2a-139	H	
2a-140	H	
2a-141	H	
2a-142	H	
2a-143	H	
2a-144	H	
2a-145	H	
2a-146	H	
2a-147	H	

표 2a (계속)



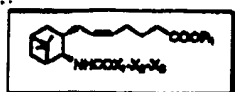
No.	-R_1	$\text{X}_1\text{-X}_2\text{-X}_3$
2a-148	H	
2a-149	H	
2a-150	H	
2a-151	H	
2a-152	H	
2a-153	H	
2a-154	H	
2a-155	H	
2a-156	H	
2a-157	H	
2a-158	H	
2a-159	H	

표 2a (계속)



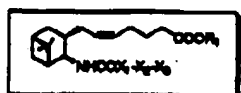
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-160	H	
2a-161	H	
2a-162	H	
2a-163	H	
2a-164	H	
2a-165	H	
2a-166	H	
2a-167	H	
2a-168	H	
2a-169	H	
2a-170	H	

표 2a (계속)



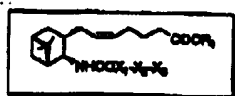
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-171	H	
2a-172	H	
2a-173	H	
2a-174	H	
2a-175	H	
2a-176	H	
2a-177	H	
2a-178	H	
2a-179	H	
2a-180	H	
2a-181	H	
2a-182	H	

표 2a (계속)



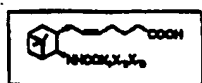
No.	- R ₁	X ₁ -X ₂ -X ₃
2a-183	H	
2a-184	H	
2a-185	H	
2a-186	H	
2a-187	H	
2a-188	H	
2a-189	H	
2a-190	H	
2a-191	H	
2a-192	H	
2a-193	H	

표 2a (계속)



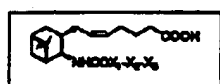
No.	R ₁	X ₁ -X ₂ -X ₃
2a-194	H	
2a-195	H	
2a-196	H	
2a-197	H	
2a-198	H	
2a-199	H	
2a-200	H	
2a-201	H	
2a-202	H	
2a-203	H	

표 2a (계속)



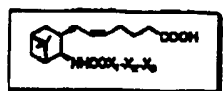
No.	$X_1-X_2-X_3$
2a-304	
2a-305	
2a-306	
2a-307	
2a-308	
2a-309	
2a-310	
2a-311	
2a-312	
2a-313	

표 2a (계속)



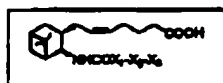
No.	$X_1-X_2-X_3$
2a-314	
2a-315	
2a-316	
2a-317	
2a-318	
2a-319	
2a-320	
2a-321	
2a-322	
2a-323	

표 2a (계속)



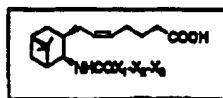
No.	X_1, X_2, X_3
2a-324	
2a-325	
2a-326	
2a-327	
2a-328	
2a-329	
2a-330	
2a-331	
2a-332	
2a-333	

표 2a (계속)



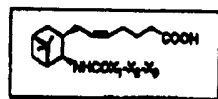
No.	$X_1-X_2-X_3$
2a-334	
2a-335	
2a-336	
2a-337	
2a-338	
2a-339	
2a-340	
2a-341	
2a-342	
2a-343	

표 2a (계속)



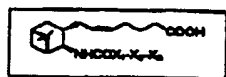
No.	$X_1-X_2-X_3$
2a-344	
2a-345	
2a-346	
2a-347	
2a-348	
2a-349	
2a-350	
2a-351	

표 2a (계속)



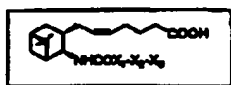
No.	X ₁ -X ₂ -X ₃
2a-252	
2a-253	
2a-254	
2a-255	
2a-256	
2a-257	

표 2a (계속)



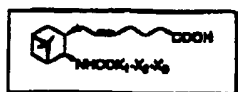
No.	X ₁ -X ₂ -X ₃
2a-258	
2a-259	
2a-260	
2a-261	
2a-262	
2a-263	
2a-264	
2a-265	
2a-266	
2a-267	

표 2a (계속)



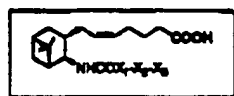
No.	X_1 - X_2 - X_3
2a-368	
2a-369	
2a-370	
2a-371	
2a-372	
2a-373	
2a-374	
2a-375	
2a-376	
2a-377	

표 2a (계속)



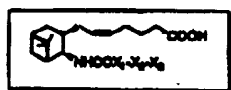
No.	X ₁ -X ₂ -X ₃
2a-278	
2a-279	
2a-280	
2a-281	
2a-282	
2a-283	
2a-284	
2a-285	
2a-286	
2a-287	

표 2a (계속)



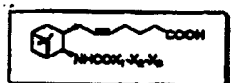
No.	X ₁ -X ₂ -X ₃
2a-288	
2a-289	
2a-290	
2a-291	
2a-292	
2a-293	
2a-294	
2a-295	
2a-296	

표 2a (계속)



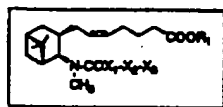
No.	X ₁ -X ₂ -X ₃
2a-377	
2a-378	
2a-379	
2a-380	
2a-381	
2a-382	
2a-383	
2a-384	
2a-385	
2a-386	

표 2a (계속)



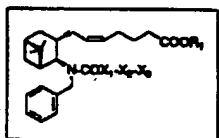
No.	X ₁ -X ₂ -X ₃
2a-387	
2a-388	
2a-389	
2a-390	
2a-391	
2a-392	
2a-393	
2a-394	
2a-395	

II 2b



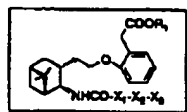
No.	R ₁	X ₁ -X ₂ -X ₃
2b-1	H	
2b-2	H	

II 2c



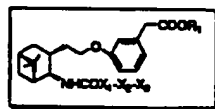
No.	R ₁	X ₁ -X ₂ -X ₃
2c-1	H	
2c-2	H	
2c-3	H	

II 2d



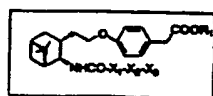
No.	R ₁	X ₁ -X ₂ -X ₃
2d-1	H	
2d-2	H	
2d-3	H	

II 2e



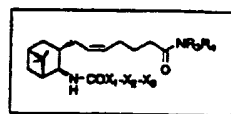
No.	R ₁	X ₁ -X ₂ -X ₃
2e-1	H	
2e-2	H	
2e-3	H	

II 2f



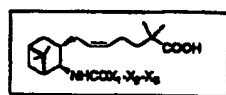
No.	R_1	$X_1-X_2-X_3$
2f-1	H	
2f-2	H	
2f-3	H	

II 2g



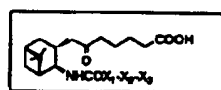
No.	R_2	R_3	$X_1-X_2-X_3$
2g-1	H	SO_2CH_3	

II 2h



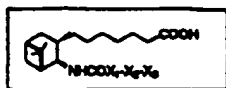
No.	$X_1-X_2-X_3$
2h-1	
2h-2	
2h-3	
2h-4	
2h-5	
2h-6	

II 2i



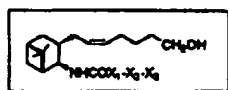
No.	$X_1-X_2-X_3$
2i-1	
2i-2	
2i-3	
2i-4	
2i-5	
2i-6	

II 2j



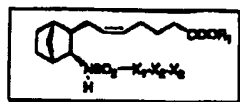
No.	$X_1-X_2-X_3$
2j-1	
2j-2	
2j-3	
2j-4	
2j-5	
2j-6	

II 2k



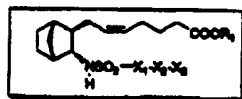
No.	$X_1-X_2-X_3$
2k-1	
2k-2	
2k-3	
2k-4	
2k-5	
2k-6	

II 3a



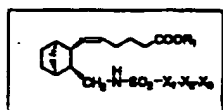
No.	R ₁	X ₁ -X ₂ -X ₃
3a-1	CH ₃	
3a-2	H	
3a-3	CH ₃	
3a-4	H	
3a-5	H ₃ C(CH ₂) ₁₀ OH	
3a-6	Nb	
3a-7	Li/Cs	
3a-8	H	
3a-9	H	
3a-10	CH ₃	
3a-11	H	
3a-12	CH ₃	
3a-13	H	
3a-14	CH ₃	
3a-15	CH ₃	
3a-16	H	
3a-17	CH ₃	
3a-18	H	

표 3a (계속)



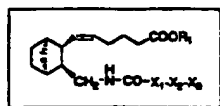
No.	R ₁	X ₁ -X ₂ -X ₃
3a-19	CH ₃	
3a-20	H	
3a-21	CH ₃	
3a-22	H	
3a-23	CH ₃	
3a-24	H	
3a-25	H	
3a-26	CH ₃	
3a-27	H	
3a-28	CH ₃	
3a-29	H	
3a-30	CH ₃	
3a-31	CH ₃	
3a-32	H	
3a-33	Nb	
3a-34	H	
3a-35	Nb	

표 3b



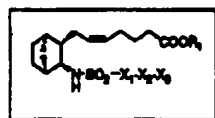
No.	R ₁	X ₁ -X ₂ -X ₃
3b-1	CH ₃	
3b-2	H	
3b-3	H	
3b-4	H	

표 3c



No.	R ₁	X ₁ -X ₂ -X ₃
3c-1	H	

표 3d



No.	R ₁	X ₁ -X ₂ -X ₃
3d-1	1/2 C ₆	
3d-2	Na	
3d-3	Na	
3d-4	Na	
3d-5	CH ₃	
3d-6	H	
3d-7	CH ₃	
3d-8	H	
3d-9	Na	
3d-10	CH ₃	
3d-11	H	
3d-12	Na	
3d-13	1/2 C ₆	
3d-14	H	
3d-15	Na	

표 3d (계속)

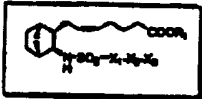










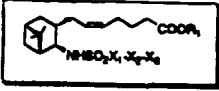

<div>  </div>		
No.	R ₁	X ₁ -X ₂ -X ₃
34-36	H	
34-37	H	
34-38	H	
34-39	CH ₃	
34-40	H	
34-41	CH ₃	
34-42	H	
34-43	H	
34-44	H	
34-45	H	
34-46	H	
34-47	H	
34-48	H	
34-49	H	

표 3e

<div>  </div>		
No.	R ₁	X ₁ -X ₂ -X ₃
3e-1	1/2Ca	

상기 화합물들의 물리화학적 특성은 하기와 같다. 화합물의 번호는 상기 표들의 번호에 상응한다.

No.1a - 4

$[\alpha]_D^{25} = -11.5^\circ$ ($\text{CHCl}_3, c=1.01, 25.5^\circ\text{C}$).

No.1a - 5

$[\alpha]_D^{25} = -10.0^\circ$ ($\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$).

No.1a - 6

$\text{CDCl}_3, 300\text{MHz}$

0.93-1.96(14H,m), 2.20-2.26(3H,m), 3.03(1H,m), 3.67(3H,s), 4.99(1H,d,J=6.6Hz), 5.10-5.24(2H,m), 7.37-7.51(3H,m), 7.54-7.64(3H,m), 7.76-7.83(2H,m), 8.11(1H,m).

IR (CHCl_3): 3384, 3278, 3025, 2952, 2874, 1727, 1436, 1411, 1324, 1155, 1097 cm^{-1} .

$[\alpha]_D^{25} = -9.0^\circ$ ($\text{CHCl}_3, c=1.04, 22.0^\circ\text{C}$).

No.1a - 7

$\text{CDCl}_3, 300\text{MHz}$

0.93-2.09(14H,m), 2.18(1H,m), 2.28(2H,t,J=7.2Hz), 3.04(1H,m), 5.15-5.25(2H,m), 5.28(1H,d,J=6.9Hz), 7.36-7.50(3H,m), 7.54-7.63(3H,m), 7.76-7.89(2H,m), 8.12(1H,m).

IR (CHCl_3): 3268, 3028, 2952, 2872, 1708, 1452, 1410, 1324, 1155, 1097 cm^{-1} .

$[\alpha]_D^{25} = 9.1^\circ$ ($\text{CHCl}_3, c=1.01, 24.0^\circ\text{C}$).

No.1a - 8

$\text{CDCl}_3, 300\text{MHz}$

0.94-1.22(14H,m), 2.21-

2.29(3H,m), 3.05(1H,m), 3.67(3H,s), 4.92(1H,d,J=6.3Hz), 5.14-

5.30(2H,m), 7.70-7.78(6H,m), 7.96-8.01(3H,m).

IR (CHCl_3): 3276, 3272, 3018, 2946, 2868, 1727, 1616, 1435, 1388, 1324, 1162, 1180, 1069 cm^{-1} .

$[\alpha]_D^{25} = +1.6^\circ$ ($\text{CHCl}_3, c=1.01, 24.0^\circ\text{C}$). mp. 117-119 $^\circ\text{C}$.

No.1a - 9

$\text{CDCl}_3, 300\text{MHz}$

0.95-2.08(14H,m), 2.19(1H,m), 2.32(2H,t,J=7.2Hz), 3.06(1H,m), 5.20-5.30(2H,m), 5.34(1H,d,J=6.6Hz), 7.69-7.78(6H,m), 7.96-8.08(2H,m).

IR (CHCl_3): 3260, 3020, 2950, 2868, 1708, 1389, 1324, 1162, 1130, 1069 cm^{-1} .

$[\alpha]_D^{25} = +13.3^\circ$ ($\text{CHCl}_3, c=1.05, 24.0^\circ\text{C}$).

mp. 118-120 $^\circ\text{C}$

No.1a - 10

$\text{CDCl}_3, 300\text{MHz}$

0.96-1.98(14H,m), 2.15-2.32(3H,m), 3.04(1H,m), 3.66(3H,s), 5.12-

5.26(5H,m), 7.67-7.78(4H,m), 7.93-8.07(4H,m).

IR (CHCl_3): 3276, 3018, 2946, 2868, 1726, 1595, 1435, 1341, 1162, 1095 cm^{-1} .

$[\alpha]_D^{25} = -1.5^\circ$ ($\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$).

mp. 188-189 $^\circ\text{C}$.

No.1a - 11

$\text{CD}_3\text{OD}, 300\text{MHz}$

1.05-1.98(14H,m), 2.13-2.22(3H,m), 2.97(1H,m), 5.09-5.22(2H,m), 7.65-

7.92(4H,m), 7.95-8.05(4H,m).

IR (KBr): 3385, 3281, 3069, 3003, 2954, 2872, 1708, 1596, 1428, 1413, 1378, 1348, 1

326, 1236, 1186, 1160, 1096 cm^{-1} .

mp. 144-146 $^\circ\text{C}$.

No.1a - 1 2

CDCl₃, 300MHz

0.96-1.96(14H,m), 2.22-2.27(2H,m), 3.02(1H,m), 3.66(2H,s), 3.87(3H,s), 4.88(1H,d,J=6.9Hz), 5.18-5.24(2H,m), 6.99-7.02(2H,m), 7.55-7.66(2H,m), 7.66-7.69(2H,m), 7.89-7.92(2H,m).

IR(CHCl₃): 3374, 3270, 3016, 2948, 2870, 1728, 1608, 1518, 1487, 1458, 1437, 1348, 1157, 1037.

[α]_D²⁰ = +4.3° (CHCl₃, c=1.01, 24°C).

mp. 85-87°C.

No.1a - 1 3

CDCl₃, 300MHz

0.97-1.99(14H,m), 2.18(1H,m), 2.30(2H,t,J=7.2Hz), 3.04(1H,m), 3.86(3H,s), 5.18(1H,d,J=6.7Hz), 5.23-5.26(2H,m), 6.99-7.02(2H,m), 7.55-7.58(2H,m), 7.66-7.68(2H,m), 7.89-7.92(2H,m).

IR(CHCl₃): 3380, 3260, 3020, 2948, 2868, 1708, 1608, 1519, 1487, 1458, 1308, 1293, 1248, 1156 /cm.

[α]_D²⁰ = +18.3° (CHCl₃, c=1.00, 25.5°C).

No.1a - 1 4

CDCl₃, 300MHz

0.98-2.00(14H,m), 2.20(1H,m), 2.25(2H,t,J=7.2Hz), 3.02(1H,m), 3.87(3H,s), 4.88(1H,d,J=6.3Hz), 5.19-5.25(2H,m), 7.18(1H,dd,J=4.8,8.6Hz), 7.89(1H,d,J=4.8Hz), 7.40(1H,d,J=3.6Hz), 7.71-7.74(2H,m), 7.86-7.89(2H,m).

IR(CHCl₃): 3374, 3270, 3018, 2946, 2868, 1727, 1598, 1484, 1434, 1322/cm.

[α]_D²⁰ = +5.6° (CHCl₃, c=1.01, 24°C).

mp. 69-71°C.

No.1a - 1 5

CDCl₃, 300MHz

0.95-2.00(14H,m), 2.17(1H,m), 2.32(2H,t,J=7.2Hz), 3.03(1H,m), 5.20(1H,d,J=6.9Hz), 5.24-5.38(2H,m), 7.18(1H,dd,J=4.8,8.3Hz), 7.88(1H,d,J=4.8Hz), 7.43(1H,d,J=3.8Hz), 7.78(2H,d,J=8.4Hz), 7.87(2H,d,J=8.4Hz).

IR(CHCl₃): 3260, 3022, 2948, 2868, 1709, 1598, 1404, 1321, 1154/cm.

[α]_D²⁰ = +20.8° (CHCl₃, c=1.07, 28°C).

mp. 71-73°C.

No.1a - 1 6

CDCl₃, 300MHz

0.98-2.00(14H,m), 2.27(2H,t,J=7.6Hz), 2.28(1H,m), 3.18(1H,m), 3.66(3H,s), 4.90(1H,d,J=6.9Hz), 5.25-5.29(2H,m), 7.40-7.65(3H,m), 7.76(1H,d,J=8.4Hz), 7.90-8.02(4H,m).

IR(CHCl₃): 3376, 3276, 3018, 2946, 2868, 1728, 1598, 1488, 1394, 1322, 1159/cm.

[α]_D²⁰ = +7.0° (CHCl₃, c=1.07, 24°C).

No.1a - 1 7

CDCl₃, 300MHz

1.02-2.07(14H,m), 2.25(1H,m), 2.34(2H,t,J=6.6Hz), 3.14(1H,m), 5.28-5.33(3H,m), 7.39-7.57(4H,m), 7.62-7.65(2H,m), 7.76(1H,d,J=8.1Hz), 7.89-8.02(4H,m).

IR(CHCl₃): 3260, 2948, 2868, 1709, 1593, 1394, 1324, 1157/cm.

[α]_D²⁰ = +20.2° (CHCl₃, c=1.02, 24°C).

No.1a - 1 8

CDCl₃, 300MHz

1.05-1.97(14H,m), 2.25(2H,t,J=7.2Hz), 2.33(1H,m), 3.12(1H,m), 3.67(3H,s), 4.91(1H,d,J=6.6Hz), 5.24-5.29(2H,m), 7.24(1H,d,J=8.9Hz), 7.89-7.95(3H,m), 7.56(1H,d,J=8.9Hz), 7.59-7.63(2H,m).

IR(CHCl₃): 3372, 3272, 3018, 2948, 2888, 1727, 1433, 1331, 1152/cm.

[α]_D²⁰ = -5.7° (CHCl₃, c = 1.01, 25°C).

No. 1a - 19

CDCl₃, 300MHz

1.05-2.05(14H, m), 2.28-2.38(2H, m), 3.18(1H, m), 5.19(1H, d, J = 6.8 Hz), 6.27-6.31(2H, m), 7.34(1H, d, J = 4.2 Hz), 7.39-7.42(2H, m), 7.58(1H, d, J = 4.2 Hz), 7.58-7.62(2H, m).

IR(CHCl₃): 3372, 3254, 3018, 2948, 2888, 1707, 1481, 1328, 1151/cm.

[α]_D²⁰ = +4.5° (CHCl₃, c = 1.01, 21.5°C).

No. 1a - 20

CDCl₃, 300MHz

1.05-2.00(14H, m), 2.28(2H, t, J = 7.5 Hz), 3.23(1H, m), 3.11(1H, m), 3.68(3H, s), 4.92(1H, d, J = 8.0 Hz), 5.27(2H, m), 7.06(1H, m), 7.10(1H, d, J = 8.6 Hz), 7.25(1H, m), 7.32(1H, m), 7.49(1H, d, J = 8.6 Hz).

IR(CHCl₃): 3372, 3272, 3018, 2948, 2888, 1727, 1438, 1417, 1322, 1151/cm.

[α]_D²⁰ = -9.2° (CHCl₃, c = 1.01, 25°C).

No. 1a - 21

CDCl₃, 300MHz

1.02-2.01(14H, m), 2.28-2.34(2H, m), 3.13(1H, m), 5.12(1H, d, J = 6.9 Hz), 6.28-6.32(2H, m), 7.06(1H, m), 7.10(1H, d, J = 3.9 Hz), 7.25(1H, m), 7.32(1H, m), 7.50(1H, d, J = 8.9 Hz).

IR(CHCl₃): 3350, 3250, 2948, 1709, 1440, 1420, 1330, 1151.

[α]_D²⁰ = +2.5° (CHCl₃, c = 1.00, 25°C).

No. 1a - 22

CDCl₃, 300MHz

0.96-2.05(14H, m), 2.25(1H, m), 2.35(2H, t, J = 7.0 Hz), 3.11(1H, m), 5.20-5.34(2H, m), 5.41(1H, d, J = 8.6 Hz), 7.31-7.49(2H, m), 7.62(1H, d, J = 7.8 Hz), 8.11(1H, d, d, J = 1.8 Hz, 7.8 Hz), 8.25(1H, d, J = 1.8 Hz).

IR(CHCl₃): 3384, 3271, 3025, 2958, 1708, 1608, 1559, 1527, 1357, 1168/cm.

[α]_D²⁰ = +18.8° (CHCl₃, c = 0.31, 22°C).

No. 1a - 23

CDCl₃, 300MHz

0.97-2.07(14H, m), 2.24(1H, m), 2.35(2H, t, J = 6.8 Hz), 3.09(1H, m), 3.86(3H, s), 5.24-5.35(2H, m), 5.44(1H, d, J = 8.3 Hz), 6.97-7.00(2H, m), 7.26-7.28(2H, m), 7.59(1H, d, J = 8.1 Hz), 8.06(1H, d, d, J = 2.1 and 8.1 Hz), 8.29(1H, d, J = 2.1 Hz).

IR(CHCl₃): 3384, 3270, 2959, 1709, 1609, 1535, 1519, 1357, 1302, 1258, 1226, 1169/cm.

[α]_D²⁰ = +17.0° (CHCl₃, c = 1.00, 21°C).

No. 1a - 24

CDCl₃, 300MHz

0.95-2.00(14H, m), 2.20-2.25(1H, m), 2.38(2H, t, J = 7.2 Hz), 3.02-3.10(1H, m), 3.66(3H, s), 4.92(1H, d, J = 8.6 Hz), 5.18-5.31(2H, m), 7.62-7.60(2H, m), 7.94-8.08(2H, m).

IR(CHCl₃): 3376, 3020, 2946, 2868, 1726, 1436, 1368, 1298, 1164, 1090, 890/cm.

[α]_D²⁰ = +11.2 ± 0.5° (CHCl₃, c = 1.04, 22.5°C)

mp. 101-103°C

No. 1a - 25

CDCl₃, 300MHz

0.95-2.08(14H, m), 2.15-2.22(1H, m), 2.38(2H, t, J = 6.8 Hz), 3.02-3.10(1H, m), 5.21-5.31(2H, m), 5.34(1H, d, J = 8.3 Hz), 7.51-7.59(2H, m), 7.92-8.07(2H, m).

IR(CHCl₃): 3258, 3022, 2948, 2868, 1707, 1599, 1324, 1298, 1163, 1089, 1051, 892/cm.

m.

$[\alpha]_D^{25} = +29.8 \pm 0.7^\circ$ ($\text{CHCl}_3, c=1.05, 25^\circ\text{C}$)

mp. 158-160°C

5 No. 1a - 26

$\text{C}_{10}\text{H}_{10}\text{N}_2\text{O}_2\text{SNa}$ 0.8%에 대 원소분석 계산치: C, 60.29; H, 6.15; N, 8.11; S, 6.19; Na, 4.44; 측정치: C, 60.15; H, 6.19; N, 8.15; S, 6.08; Na, 4.98.

$[\alpha]_D^{25} = -16.6^\circ$ ($\text{CHCl}_3, c=1.04, 25.0^\circ\text{C}$).

No. 1a - 27

$\text{CDCl}_3, 300\text{MHz}$

0.92-1.98(14H, m), 2.20(1H, m), 2.26(2H, t, $J=7.5\text{Hz}$), 3.08(1H, m), 3.12(6H, s), 3.66(3H, s), 4.87(1H, d, $J=6.6\text{Hz}$), 5.18-5.52(2H, m), 6.75-6.80(2H, m), 7.55-8.00(6H, m).

IR(CHCl_3): 3376, 3020, 2946, 1726, 1601, 1518, 1442, 1419, 1362, 1312, 1163, 1133, 1088 cm^{-1} .

$[\alpha]_D^{25} = +55.3^\circ$ ($\text{CHCl}_3, c=0.53, 24.0^\circ\text{C}$).

mp. 158-163°C

No. 1a - 28

$\text{CDCl}_3 + \text{CD}_3\text{OD}, 300\text{MHz}$

0.99-2.14(14H, m), 2.21(1H, m), 2.31(2H, t, $J=7.2\text{Hz}$), 2.94(1H, m), 3.12(6H, s), 5.22-5.38(2H, m), 6.73-6.81(2H, m), 7.87-8.00(6H, m).

IR(KBr): 3434, 3309, 2946, 1708, 1604, 1520, 1442, 1418, 1366, 1312, 1252, 1164, 1155, 1134, 1091 cm^{-1} .

$[\alpha]_D^{25}$ 측정할 수 없음 (유체, 불충분한 에너지)

mp. 198-198°C

No. 1a - 29

$\text{CD}_3\text{OD}, 300\text{MHz}$

1.02-1.98(14H, m), 2.10(2H, t, $J=7.8\text{Hz}$), 2.16(1H, m), 2.98(1H, m), 3.11(6H, s), 5.07-5.27(2H, m), 6.80-6.87(2H, m), 7.84-8.00(6H, m).

IR(KBr): 3435, 3087, 3004, 2949, 2871, 1604, 1565, 1520, 1444, 1420, 1364, 1312, 1253, 1168, 1138, 1090 cm^{-1} .

$[\alpha]_D^{25}$ 측정할 수 없음

No. 1a - 30

$\text{CDCl}_3, 300\text{MHz}$

0.95-1.99(14H, m), 2.22(1H, m), 2.26(2H, t, $J=7.2\text{Hz}$), 2.35(3H, s), 3.06(1H, m), 3.66(3H, s), 4.95(1H, d, $J=6.9\text{Hz}$), 5.15-5.30(2H, m), 7.26-7.32(2H, m), 7.97-8.06(6H, m).

IR(CHCl_3): 3374, 2996, 2946, 2868, 1763, 1728, 1591, 1495, 1435, 1366, 1299, 1238, 1192, 1163, 1139 cm^{-1} .

$[\alpha]_D^{25} = +12.9^\circ$ ($\text{CHCl}_3, c=1.04, 26.0^\circ\text{C}$).

No. 1a - 31

$\text{CDCl}_3, 300\text{MHz}$

0.93-2.01(14H, m), 2.19(1H, m), 2.31(2H, t, $J=7.2\text{Hz}$), 2.35(3H, s), 3.06(1H, m), 5.17-5.32(2H, m), 7.25-7.32(2H, m), 7.96-8.07(6H, m).

IR(CHCl_3): 3387, 3028, 2952, 2874, 1789, 1708, 1592, 1495, 1368, 1328, 1299, 1168, 1138, 1088, 1050, 1008 cm^{-1} .

$[\alpha]_D^{25} = +21.7^\circ$ ($\text{CHCl}_3, c=0.51, 22^\circ\text{C}$).

No. 1a - 32

$\text{CDCl}_3, 300\text{MHz}$

.98-1.99(14H, m), 2.21(1H, m), 2.27(2H, t, $J=7.2\text{Hz}$), 2.05(1H, m), 3.87(2H, s), 4.92(1H, d, $J=6.6\text{Hz}$), 5.15-5.30(2H, m), 6.72(1H, s), 6.96-7.00(2H, m), 7.86-8.04(6H, m).

- IR(CHCl₃): 3374, 3378, 3018, 2948, 2888, 1725, 1606, 1589, 1502, 1488, 1396, 1280, 1271, 1184, 1135, 1069 /cm. $[\alpha]_D^{25} = +18.6^\circ$ (CHCl₃, c=1.00, 26.0°C).
- No.1a - 3 3
- 8 CDCl₃+CD₃OD 800MHz
0.98-2.08(14H,m), 2.20(1H,m), 2.28(2H,t,J=7.2Hz), 2.98(1H,m), 5.18-5.32(2H,m), 6.92-6.99(2H,m), 7.85-8.02(6H,m).
IR(KBr): 3385, 3248, 2948, 2876, 1717, 1601, 1505, 1480, 1399, 1288, 1280, 1219, 1165, 1136, 1093 /cm.
10 $[\alpha]_D^{25} = -18.0^\circ$ (CH₃OH, c=1.08, 26.0°C).
mp. 205-210°C
- No.1a - 3 4
mp. 82-83°C $[\alpha]_D^{25} = +18.6^\circ$ (CHCl₃, c=1.01, 22.5°C).
- 15
- No.1a - 3 5
mp. 80-82°C $[\alpha]_D^{25} = -1.8^\circ$ (CHCl₃, c=1.07, 22.0°C).
- No.1a - 3 6
- 20 TLC Rf=0.25 (메틸아세티드/에-헥산 = 1:1 (0.5% 아세트산))
- No.1a - 3 7
CDCl₃ 800MHz
0.92-1.96(14H,m), 2.21(1H,m), 2.27(2H,t,J=7.4Hz), 3.01(1H,m), 3.66(3H,s), 4.7
26 1(1H,d,J=6.6Hz), 5.14-5.29(2H,m), 7.12(1H,d,J=16.2Hz), 7.34(1H,d,J=16.2Hz),
7.28-7.42(3H,m), 7.52-7.56(2H,m), 7.63(2H,d,J=8.7Hz), 7.85(2H,d,J=8.7Hz).
IR(CHCl₃): 3384, 3283, 3028, 2954, 2876, 1780, 1695, 1494, 1317, 1162, 1147 /cm.
 $[\alpha]_D^{25} = +10.5^\circ$ (CHCl₃, c=1.01, 24°C).
mp 116-117 °C.
- No.1a - 3 8
CDCl₃ 800MHz
0.92-1.99(14H,m), 2.17(1H,m), 2.32(2H,t,J=7.2Hz), 3.02(1H,m), 5.28-5.29(3H,m), 7.11(1H,d,J=16.2Hz), 7.23(1H,d,J=16.2Hz), 7.28-7.41(3H,m), 7.52-7.55(2H,m), 7.61(2H,d,J=8.7Hz), 7.86(2H,d,J=8.7Hz).
IR(CHCl₃): 3515, 3384, 3270, 3022, 3015, 2957, 2876, 2689, 1708, 1595, 1496, 1320, 1157 /cm.
 $[\alpha]_D^{25} = +27.1^\circ$ (CHCl₃, c=1.02, 24°C).
- No.1a - 3 9
CDCl₃ 800MHz
0.92-1.99(14H,m), 2.15(1H,m), 2.26(2H,t,J=7.4Hz), 3.01(1H,m), 3.68(3H,s), 4.9
6(1H,d,J=6.6Hz), 5.16-5.32(2H,m), 6.60(1H,d,J=12.0Hz), 6.74(1H,d,J=12.0Hz), 7.16-7.28(5H,m), 7.85(2H,d,J=8.4Hz), 7.72(2H,d,J=8.4Hz).
IR(CHCl₃): 3384, 3283, 3023, 3015, 2954, 2876, 1730, 1595, 1493, 1324, 1182, 1147 /cm.
 $[\alpha]_D^{25} = +13.7^\circ$ (CHCl₃, c=1.00, 24°C).
- No.1a - 4 0
CDCl₃ 800MHz
0.90-2.16(14H,m), 2.12(1H,m), 2.34(2H,t,J=7.2Hz), 3.02(1H,m), 5.16(1H,d,J=6.9Hz), 5.29-5.34(2H,m), 6.60(1H,d,J=12.8Hz), 6.74(1H,d,J=12.8Hz), 7.14-7.24(5H,m), 7.85(2H,d,J=8.1Hz), 7.72(2H,d,J=8.1Hz).
IR(CHCl₃): 3515, 3384, 3283, 3025, 3021, 3014, 2957, 2876, 2688, 1709, 1595, 1322, 1182, 1147 /cm.
 $[\alpha]_D^{25} = +26.4^\circ$ (CHCl₃, c=1.00, 24°C).
- No.1a - 4 1

CDCl₃, 300MHz
0.99-1.99(14H,m), 2.17(1H,m), 2.22(2H,t,J=7.2Hz), 2.00(1H,m), 2.94(2H,s),
5.20-5.28(2H,m), 6.90-6.95(2H,m), 6.99(1H,d,J=16.2Hz), 7.17(1H,d,J=16.2Hz),
7.46-7.49(2H,m), 7.55(2H,d,J=8.4Hz), 7.83(2H,d,J=8.4Hz).
IR(CHCl₃): 2858, 2918, 2902, 2950, 1709, 1590, 1509, 1457, 1404, 1302, 1250, 1153
/cm.
[α]_D = +20.3° (CHCl₃, c=1.00, 25°C).
mp. 99-100 °C

No. 1a - 4 2
CDCl₃, 300MHz
1.01-1.99(14H,m), 2.25(2H,t,J=7.2Hz), 2.20(1H,m), 3.10(1H,m), 3.56(2H,s), 5.0
7(1H,br), 5.25-5.30(2H,m), 6.98-7.04(2H,m), 7.16(1H,d,J=16.2Hz), 7.23-7.27(2
H,m), 7.47-7.50(2H,m).
IR(CHCl₃): 2872, 2876, 2920, 2946, 2870, 1727, 1491, 1483, 1331, 1152 /cm.
[α]_D = -11.5° (CHCl₃, c=1.07, 21.5°C).

No. 1a - 4 3
CDCl₃, 300MHz
0.98-2.00(14H,m), 2.11-2.36(2H,m), 3.12(1H,m), 5.10(1H,d,J=8.6Hz), 5.39-
5.32(2H,m), 6.99-7.04(2H,m), 7.29(1H,d,J=21.6Hz), 7.22-7.49(2H,m).
IR(CHCl₃): 2880, 3248, 3020, 2946, 2868, 1709, 1491, 1430, 1329, 1151 /cm.
[α]_D = +3.4° (CHCl₃, c=1.03, 25°C).

No. 1a - 4 4
CDCl₃, 300MHz
1.00-2.00(14H,m), 2.15(1H,m), 2.29(2H,t,J=7.4Hz), 2.90-3.13(2H,m), 3.68(2H,s),
4.74(1H,d,J=6.6Hz), 5.15-5.20(2H,m), 7.18-7.29(2H,m), 7.76(2H,d,J=8.1Hz).
IR(CHCl₃): 2884, 2882, 3063, 3023, 3023, 3016, 2953, 2876, 1730, 1599, 1496, 1319,
1157 /cm.
[α]_D = +2.3° (CHCl₃, c=1.00, 25°C).
mp. 85.0-86.0°C

No. 1a - 4 5
CDCl₃, 300MHz
0.90-2.05(14H,m), 2.09(1H,m), 2.35(2H,t,J=8.9Hz), 2.90-3.13(2H,m), 5.18(1H,
d,J=6.6Hz), 5.24-5.34(2H,m), 7.10-7.27(2H,m), 7.76(2H,d,J=8.4Hz).
IR(CHCl₃): 3510, 3284, 3270, 3067, 3063, 3026, 3018, 3014, 2955, 2876, 2670, 1706,
1599, 1498, 1318, 1157 /cm.
[α]_D = +8.5° (CHCl₃, c=1.01, 25°C).

No. 1a - 4 6
[α]_D = +6.8° (CHCl₃, c=1.05, 25°C). mp. 99-100°C.

No. 1a - 4 7
CDCl₃, 300MHz
0.97-2.01(14H,m), 2.14(1H,m), 2.35(2H,t,J=7.2Hz), 3.02(1H,m), 5.23(1H,d,J=6.
4Hz), 5.26-5.30(2H,m), 7.27-7.39(2H,m), 7.54-7.55(2H,m), 7.63-7.66(2H,m), 7.8
5-7.88(2H,m).
IR(CHCl₃): 2875, 3260, 3022, 2946, 2212, 1707, 1596, 1497, 1396, 1322, 1160 /cm.
[α]_D = +25.0° (CHCl₃, c=1.02, 24°C). mp. 117-118°C.

No. 1a - 4 8
CD₃OD, 300MHz
1.05-1.98(14H,m), 2.10-2.15(2H,m), 2.96(1H,m), 5.05-5.28(2H,m), 7.33-7.40(2
H,m), 7.554-7.56(2H,m), 7.69(1H,d,J=8.4Hz), 7.67(1H,d,J=8.4Hz).

No. 1a - 4 9

CDCl₃, 300MHz
0.96-1.97(14H,m), 2.24(1H,m), 2.31(2H,t,J=6.9Hz), 3.06(1H,m), 3.69(2H,s), 5.1
5(1H,d,J=6.6Hz), 5.26-5.27(2H,m), 7.40-7.43(2H,m), 7.61-7.64(2H,m), 7.85(1H,
d,J=6.1Hz), 8.07(1H,dd,J=6.1,1.8Hz), 8.58(1H,d,J=1.8Hz).
IR(CHCl₃): 3374, 3020, 2948, 2870, 2212, 1728, 1606, 1530, 1493, 1437, 1346, 1167/
cm.

[α]_D²⁰ = +2.4° (CHCl₃, c=1.02, 25°C). mp. 77-79°C.

No. 1a - 5 0

CDCl₃, 300MHz
1.00-2.02(14H,m), 2.20(1H,m), 2.34(2H,t,J=6.6Hz), 3.08(1H,m), 5.26-5.29(2H,
m), 5.41(1H,d,J=6.9Hz), 7.40-7.43(2H,m), 7.61-7.64(2H,m), 7.84(1H,d,J=6.1Hz),
8.07(1H,dd,J=6.4,1.8Hz), 8.57(1H,dd,J=1.8Hz).
IR(CHCl₃): 3380, 3254, 2952, 2880, 2213, 1707, 1606, 1531, 1493, 1409, 1344, 1166.

[α]_D²⁰ = +23.4° (CHCl₃, c=1.00, 25°C).

No. 1a - 5 1

CDCl₃, 300MHz
0.95-1.98(14H,m), 2.23(1H,m), 2.30(2H,t,J=7.2Hz), 3.00(1H,m), 3.66(2H,s), 4.6
6(2H,br), 4.70(1H,d,J=6.9Hz), 5.20-5.29(2H,m), 7.15(1H,dd,J=7.8,1.8Hz), 7.23
(1H,d,J=1.8Hz), 7.36-7.39(2H,m), 7.48(1H,d,J=7.8Hz), 7.53-7.56(2H,m).
IR(CHCl₃): 3494, 3386, 3028, 2952, 2874, 1725, 1611, 1559, 1497, 1423, 1317, 1162/
cm.

No. 1a - 5 2

CDCl₃, 300MHz
0.96-2.04(16H,m), 2.20(1H,m), 2.36(2H,t,J=6.9Hz), 2.99(1H,m), 5.17(1H,d,J=6.
3Hz), 5.28-5.31(2H,m), 7.18(1H,dd,J=9.6,1.8Hz), 7.35(1H,m), 7.56-7.59(2H,m),
7.46(1H,d,J=7.8Hz), 7.52-7.56(2H,m).
IR(CHCl₃): 3482, 3376, 3260, 3022, 2948, 2868, 1708, 161
2, 1495, 1422, 1317/cm.
[α]_D²⁰ = +15.0° (CHCl₃, c=1.00, 24°C).

No. 1a - 5 3

CDCl₃, 300MHz
1.01-2.05(15H,m), 2.31(2H,t,J=7.2Hz), 3.10(1H,m), 3.67(2H,s), 5.02(1H,br), 5.3
6-5.38(2H,m), 7.18(1H,d,J=4.2Hz), 7.36-7.39(2H,m), 7.48(1H,d,J=4.2Hz), 7.51-
7.55(2H,m).
IR(CHCl₃): 3372, 3270, 3018, 3004, 2946, 2868, 2202, 1728, 1488, 1433, 1336, 116
4/cm.
[α]_D²⁰ = +0.6° (CHCl₃, c=1.11, 25°C). [α]_m²⁰ = +17.8° (CHCl₃, c=1.11, 25°C).

No. 1a - 5 4

CDCl₃, 300MHz
0.99-2.11(14H,m), 2.27(1H,m), 2.37(2H,t,J=7.5Hz), 3.18(1H,m), 5.16(1H,d,J=6.
6Hz), 5.31-5.35(2H,m), 7.18(1H,d,J=3.6Hz), 7.27-7.39(2H,m), 7.50(1H,d,J=3.6
Hz), 7.52-7.55(2H,m).
IR(CHCl₃): 3484, 3370, 3246, 2948, 2868, 2202, 1708, 1488, 1429, 1336, 1153/cm.
[α]_D²⁰ = +17.8° (CHCl₃, c=1.00, 24°C). mp. 95-98°C

No. 1a - 5 5

CDCl₃, 300MHz
0.95-1.93(14H,m), 2.15(1H,m), 2.34(2H,t,J=7.5Hz), 3.00(1H,m), 3.66(2H,s), 5.1
0-5.30(2H,m), 7.40-7.60(7H,m), 7.70(1H,d,J=7.8Hz), 8.08(1H,d,J=6.1Hz). IR
(CHCl₃): 3386, 3020, 2948, 2848, 2210, 1737, 1490, 1458, 1437, 1341, 1165/cm. [α]
_D²⁰ = -58.4° (CHCl₃, c=1.00, 26°C). mp. 84-88°C.

No.1a - 5 6

CDCl₃, 300MHz

0.95-1.95(14H,m), 2.10(1H,m), 2.37(2H,t, J=6.9Hz), 2.00(1H,m), 5.17-5.31(2H,m), 5.38(1H,d, J=6.9Hz), 7.39-7.60(7H,m), 7.70(1H,dd, J=7.8,1.5Hz), 8.07(1H, J=6.6,1.5Hz).

IR(CHCl₃): 2864, 2926, 2952, 2974, 3212, 1707, 1597, 1491, 1458, 1411, 1341, 1164/cm.

[α]_D²⁰ = -48.1° (CHCl₃, c=1.00, 25°C).

No.1a - 5 7

CDCl₃, 300MHz

0.99-1.97(14H,m), 2.23-2.30(3H,m), 2.01(1H,m), 3.67(2H,s), 5.17-5.36(2H,m), 7.36-7.38(3H,m), 7.50-7.55(3H,m), 7.60(1H,m), 7.83(1H,m), 8.05(1H,m).

IR(CHCl₃): 2876, 2920, 2946, 2970, 1727, 1598, 1491, 1427, 1412, 1330, 1245, 1163/cm.

[α]_D²⁰ = -12.7° (CHCl₃, c=1.00, 24°C).

No.1a - 5 8

CDCl₃, 300MHz

0.97-1.98(14H,m), 2.20(1H,m), 2.33(2H,t, J=6.9Hz), 2.02(1H,m), 5.19-5.28(3H,m), 7.36-7.38(3H,m), 7.47-7.55(3H,m), 7.69(1H,m), 7.83(1H,m), 8.04(1H,m).

IR(CHCl₃): 2876, 2960, 3022, 3002, 2948, 2868, 2920, 1708, 1598, 1490, 1455, 1412, 1327, 1162/cm.

[α]_D²⁰ = -8.6° (CHCl₃, c=1.01, 24°C).

No.1a - 5 9

CDCl₃, 300MHz

0.95-1.99(24H,m), 2.20(1H,m), 2.28(2H,t, J=7.6Hz), 2.55(1H,s), 2.96(1H,m), 3.69(3H,s), 4.99(1H,d, J=6.6Hz), 5.18-5.20(2H,m), 7.53(2H,d, J=8.4Hz), 7.82(2H,d, J=8.4Hz).

IR(CHCl₃): 3582, 3376, 3002, 2936, 2852, 1725, 1591, 1490, 1437, 1392, 1325, 1160/cm.

[α]_D²⁰ = -5.8° (CHCl₃, c=1.00, 24°C).

No.1a - 5 0

CDCl₃, 300MHz

0.96-2.05(24H,m), 2.22(1H,m), 2.33(2H,m), 2.63(1H,m), 5.22-5.36(2H,m), 5.80(1H,d, J=5.7Hz), 7.50(2H,d, J=8.7Hz), 7.50(3H,d, J=8.7Hz).

IR(CHCl₃): 3376, 3260, 3022, 2936, 2852, 1710, 1592, 1491, 1452, 1395, 1325, 1159/cm.

[α]_D²⁰ = -3.9° (CHCl₃, c=1.06, 24°C).

mp. 88-91°C

No.1a - 5 1

CDCl₃, 300MHz

0.95-2.24(23H,m), 2.29(2H,m), 2.99(1H,m), 3.69(3H,s), 4.75(1H,d, J=6.3Hz), 5.31-5.24(2H,m), 5.28(1H,m), 7.50-7.52(2H,m), 7.77-7.80(2H,m).

IR(CHCl₃): 3374, 3270, 3018, 2942, 2868, 3196, 1728, 1589, 1490, 1425, 1324, 1158/cm.

[α]_D²⁰ = +7.7° (CHCl₃, c=1.02, 24°C). mp. 98-95°C

No.1a - 5 2

CDCl₃, 300MHz

0.96-2.45(23H,m), 2.36(2H,d, J=8.9Hz), 2.99(1H,m), 5.24(1H,d, J=6.3Hz), 5.24-5.32(2H,m), 5.28(1H,m), 7.50-7.53(2H,m), 7.78-7.81(2H,m). IR(CHCl₃): 3468, 3374, 3260, 3020, 2942, 2868, 3196, 1592, 1490, 1455, 1328, 1222, 1157/cm.

[α]_D²⁰ = +19.4° (CHCl₃, c=1.03, 24°C).

No.1a - 8 3

CDCl₃, 300MHz

0.95-1.95(2H,m), 2.16(1H,m), 2.29(2H,t, J=7.2Hz), 2.43(2H,t, J=6.9Hz), 2.94(1H,m), 3.69(3H,s), 4.95(1H,d, J=6.9Hz), 5.21-5.24(2H,m), 7.49(2H,d, J=8.7Hz), 7.79(2H, J=8.7Hz).

IR(CHCl₃): 3376, 3016, 2946, 2866, 2222, 1727, 1592, 1456, 1435, 1325, 1158/cm.

[α]_D²⁰ = +8.7° (CHCl₃, c=1.00, 25°C).

No.1a - 8 4

CDCl₃, 300MHz

0.93-1.97(2H,m), 2.35(2H,t, J=7.2Hz), 2.48(2H,t, J=7.2Hz), 3.00(1H,m), 5.08(1H,d, J=6.6Hz), 5.26-5.27(2H,m), 7.49(2H,d, J=8.7Hz), 7.78(2H,d, J=8.7Hz).

IR(CHCl₃): 3260, 3020, 2948, 2864, 2222, 1708, 1592, 1489, 1456, 1397, 1324, 1156/cm.

[α]_D²⁰ = +14.4° (CHCl₃, c=1.00, 25°C) mp. 70-71°C.

No.1a - 8 5

CDCl₃, 300MHz

0.95-1.98(1H,m), 2.18(1H,m), 2.30(2H,t, J=7.2Hz), 3.00(1H,m), 3.67(3H,s), 4.82(1H,d, J=6.9Hz), 5.22-5.25(2H,m), 5.84(1H,br), 5.82-6.85(2H,m), 7.42-7.45(2H,m), 7.59-7.62(2H,m), 7.82-7.85(2H,m).

IR(CHCl₃): 3576, 3374, 3016, 2946, 2866, 2208, 1725, 1607, 1587, 1514, 1485, 1325, 1270, 1162, 1133/cm.

[α]_D²⁰ = +9.1° (CHCl₃, c=1.03, 24°C), mp. 111-112°C

No.1a - 8 6

CDCl₃, 300MHz

0.97-2.08(1H,m), 2.15(1H,m), 2.35(2H,t, J=7.6Hz), 3.00(1H,m), 5.17(1H,d, J=6.6Hz), 5.26-5.30(2H,m), 6.82-6.85(2H,m), 7.42-7.45(2H,m), 7.59-7.62(2H,m), 7.8

2-7.85(2H,m).

IR(CHCl₃): 3260, 2948, 2870, 2208, 1709, 1607, 1587, 1514, 1396, 1325, 1270, 1162, 1133/cm.

[α]_D²⁰ = -21.0° (CHCl₃, c=1.00, 23°C), mp. 161-162°C

No.1a - 8 7

CDCl₃, 300MHz

0.95-1.98(1H,m), 2.20(1H,m), 2.29(2H,t, J=7.2Hz), 3.01(1H,m), 3.67(3H,s), 4.82(1H,d, J=6.6Hz), 5.19-5.27(2H,m), 7.06-7.10(2H,m), 7.51-7.56(2H,m), 7.61-7.64(2H,m), 7.84-7.87(2H,m).

IR(CHCl₃): 3374, 3260, 3020, 2948, 2868, 2214, 1727, 1589, 1509, 1485, 1327, 1288, 1161, 1134/cm.

[α]_D²⁰ = +6.7° (CHCl₃, c=1.01, 24°C), mp. 84-85°C

No.1a - 8 8

CDCl₃, 300MHz

0.96-2.01(1H,m), 2.15(1H,m), 2.34(2H,t, J=6.9Hz), 3.02(1H,m), 5.23-5.27(2H,m), 7.04-7.10(2H,m), 7.51-7.56(2H,m), 7.61-7.64(2H,m), 7.85-7.88(2H,m).

IR(CHCl₃): 3374, 3258, 3020, 2948, 2868, 2214, 1708, 1589, 1509, 1455, 1398, 1322, 1156/cm.

[α]_D²⁰ = +22.6° (CHCl₃, c=1.02, 24°C), mp. 185-186°C

No.1a - 8 9

CDCl₃, 300MHz

0.95-1.98(1H,m), 2.19(1H,m), 2.29(2H,t, J=7.2Hz), 2.59(3H,s), 3.01(1H,m), 3.69(3H,s), 4.80(1H,d, J=6.6Hz), 5.20-5.29(2H,m), 7.18(2H,d, J=8.1Hz), 7.44(2H,d, J=8.1Hz), 7.62(2H,d, J=8.4Hz), 7.84(2H,d, J=8.4Hz).

IR(CHCl₃): 3374, 3022, 2946, 2868, 2210, 1727, 1589, 1511, 1485, 1323, 1161, 1132/cm.

$[\alpha]_D^{25} = +9.3^\circ$ ($\text{CHCl}_3, c = 1.02, 24^\circ\text{C}$).

mp. 116-118°C

No. 1a - 7 0

CDCl_3 , 800MHz

1.15-2.00(14H, m), 2.12(1H, m), 2.28-2.38(5H, m), 2.04(1H, m), 5.14(1H, d, J=6.6 Hz), 5.25-5.30(2H, m), 7.17(2H, d, J=7.8 Hz), 7.44(2H, d, J=7.8 Hz), 7.62(2H, d, J=8.4 Hz), 7.65(2H, d, J=8.4 Hz).

IR(CHCl_3): 3380, 3260, 3020, 2948, 2868, 2210, 1708, 1590, 1511, 1396, 1324, 1160, 1132/cm.

$[\alpha]_D^{25} = +24.6^\circ$ ($\text{CHCl}_3, c = 1.00, 24^\circ\text{C}$).

No. 1a - 7 1

CDCl_3 , 800MHz

0.95-1.95(14H, m), 2.19(1H, m), 2.29(2H, t, J=7.2 Hz), 3.00(1H, m), 3.20(1H, s), 3.6(3H, s), 4.81(1H, d, J=6.6 Hz), 5.20-5.27(2H, m), 7.46-7.54(4H, m), 7.62-7.65(2H, m), 7.85-7.88(2H, m).

IR(CHCl_3): 3374, 3290, 3018, 3002, 2946, 2868, 2212, 2110, 1726, 1591, 1507, 1455, 1401, 1324, 1181/cm.

$[\alpha]_D^{25} = +9.6^\circ$ ($\text{CHCl}_3, c = 1.01, 24^\circ\text{C}$), mp. 136-138°C.

No. 1a - 7 2

CDCl_3 , 800MHz

0.96-2.01(14H, m), 2.14(1H, m), 2.35(2H, t, J=7.2 Hz), 3.06(1H, m), 3.20(1H, s), 5.16(1H, d, J=7.2 Hz), 5.26-5.29(2H, m), 7.45-7.53(4H, m), 7.63(2H, d, J=8.4 Hz), 7.87(2H, d, J=8.4 Hz).

IR(CHCl_3): 3462, 3374, 3290, 3024, 2948, 2868, 2212, 2110, 1708, 1591, 1508, 1455, 1401, 1321, 1274, 1160, 1132/cm.

$[\alpha]_D^{25} = +24.3^\circ$ ($\text{CHCl}_3, c = 1.03, 24^\circ\text{C}$), mp. 96-98°C

No. 1a - 7 3

CDCl_3 , 800MHz

0.95-1.95(14H, m), 2.19(1H, m), 2.27-2.32(3H, m), 3.01(1H, m), 3.67(3H, s), 4.80(1H, d, J=6.6 Hz), 5.20-5.27(2H, m), 7.12(2H, m), 7.56(2H, m), 7.63(2H, m), 7.84(2H, m).

IR(CHCl_3): 3374, 3276, 3018, 2946, 2868, 2214, 1762, 1730, 1589, 1506, 1435, 1368, 1161/cm.

$[\alpha]_D^{25} = +7.8^\circ$ ($\text{CHCl}_3, c = 1.02, 24^\circ\text{C}$), mp. 102-104°C

No. 1a - 7 4

CDCl_3 , 800MHz

0.95-2.05(14H, m), 2.15(1H, m), 2.32-2.37(5H, m), 3.02(1H, m), 5.14(1H, d, J=6.6 Hz), 5.26-5.30(2H, m), 7.10-7.13(2H, m), 7.54-7.57(2H, m), 7.62-7.64(2H, m), 7.84-7.87(2H, m).

IR(CHCl_3): 3482, 3250, 3022, 2946, 2868, 2214, 1716, 1709, 1589, 1507, 1454, 1396, 1366, 1322, 1195, 1161/cm.

$[\alpha]_D^{25} = +15.0^\circ$ ($\text{CHCl}_3, c = 1.00, 24^\circ\text{C}$), mp. 129-131°C

No. 1a - 7 5

CDCl_3 , 800MHz

0.95-1.99(14H, m), 2.20(1H, m), 2.30(2H, t, J=7.2 Hz), 3.02(1H, m), 3.67(3H, s), 3.94(3H, s), 4.79(1H, d, J=6.6 Hz), 5.19-5.29(2H, m), 7.60-7.63(2H, m), 7.65-7.67(2H, m), 7.86-7.89(2H, m), 8.04-8.06(2H, m).

IR(CHCl_3): 3378, 3018, 2946, 2860, 1720, 1604, 1455, 1507, 1276, 1161, 1108 /cm.

$[\alpha]_D^{25} = +7.3^\circ$ ($\text{CHCl}_3, c = 1.01, 25^\circ\text{C}$), mp. 122-123°C

No. 1a - 7 6

$\text{CDCl}_3 + \text{CD}_3\text{OD}$ 800MHz

1.04-2.05(14H,m), 2.19(1H,m), 2.22(2H,t,J=6.9Hz), 2.98(1H,m), 5.27-5.31(2H,m), 7.60-7.63(2H,m), 7.65-7.69(2H,m), 7.86-7.89(2H,m), 8.05-8.07(2H,m).
IR(CHCl₃): 3402, 3299, 2953, 2876, 2865, 2549, 1455, 1422, 1313, 1281, 1164 /cm.
[α]_D²⁰ = -21.1° (CH₃OH, c=1.03, 25°C). mp. 227-229(dec.)

No. 1a - 7 7

CDCl₃, 300MHz

0.96-1.99(14H,m), 2.20(1H,m), 2.30(2H,t,J=7.2Hz), 3.02(1H,m), 3.66(3H,s), 4.8
8(1H,d,J=8.3Hz), 5.19-5.29(2H,m), 7.67-7.72(4H,m), 7.89-7.91(2H,m), 8.24-8.2
7(2H,m).

IR(CHCl₃): 3276, 3276, 3020, 2946, 2870, 2314, 1725, 1594, 1519, 1455, 1435, 138
9, 1344, 1161/cm.

[α]_D²⁰ = +7.7° (CHCl₃, c=1.02). mp. 87-89°C

No. 1a - 7 8

CDCl₃, 300MHz

0.98-2.00(14H,m), 2.15(1H,m), 2.34(2H,t,J=7.2Hz), 3.02(1H,m), 5.24-5.28(2H,m),
5.32(1H,d,J=5.7Hz), 7.67-7.72(4H,m), 7.89-7.92(2H,m), 8.23-8.26(2H,m).

IR(CHCl₃): 3374, 3260, 2948, 2314, 1708, 1595, 1344, 1160/cm.

[α]_D²⁰ = +23.8° (CHCl₃, c=1.00). mp. 102-103°C.

No. 1a - 7 9

CDCl₃, 300MHz

0.93-2.02(14H,m), 2.13(1H,m), 2.36(2H,t,J=7.1Hz), 3.05(1H,m), 3.84(3H,s), 5.1
8(1H,br), 5.27-5.31(2H,m), 5.85-6.91(2H,m), 7.48-7.50(2H,m), 7.60-7.63(2H,m),
7.83-7.85(2H,m).

IR(CHCl₃): 3280, 3252, 3020, 2950, 2868, 2208, 1708, 1599, 1511, 1457, 1396, 1221,
1286, 1160/cm.

[α]_D²⁰ = +26.7° (CHCl₃, c=1.00). mp. 75-77°C

No. 1a - 8 0

CDCl₃, 300MHz

0.96-1.99(14H,m), 2.21(1H,m), 2.30(2H,t,J=7.8Hz), 3.02(1H,m), 3.66(3H,s), 4.8
0(1H,d,J=6.6Hz), 5.19-5.28(2H,m), 7.51-7.77(5H,m), 7.87-7.90(2H,m), 8.13(1H,
m).

IR(CHCl₃): 3374, 3270, 3018, 2946, 2868, 2216, 1726, 1607, 1567, 1527, 1495, 1456,
1436, 1244, 1296, 1161/cm.

[α]_D²⁰ = +7.4° (CHCl₃, c=1.00, 23°C). mp. 65-70°C

No. 1a - 8 1

CDCl₃, 300MHz

0.97-2.01(14H,m), 2.16(1H,m), 2.34(2H,t,J=7.2Hz), 3.01(1H,m), 5.22-5.28(3H,m),
7.51(1H,m), 7.66(1H,m), 7.70-7.76(3H,m), 7.88-7.91(2H,m), 8.13(1H,dd,J=6.
9Hz, 1.5Hz).

IR(CHCl₃): 3480, 3382, 3262, 3026, 2952, 2872, 2218, 1708, 1607, 1567, 1526, 1396,
1348, 1225, 1160/cm.

[α]_D²⁰ = +22.0° (CHCl₃, c=1.00). mp. 92-94°C

20 No. 1a - 8 2

CDCl₃, 300MHz

0.95-1.98(14H,m), 2.20(1H,m), 2.29(2H,t,J=7.2Hz), 3.01(1H,m), 3.67(3H,s), 4.3
0(2H,br), 4.79(1H,d,J=6.9Hz), 5.20-5.29(2H,m), 6.71-6.76(2H,m), 7.18(1H,m), 7.
87(1H,dd,J=7.8, 1.2Hz), 7.61-7.65(2H,m), 7.83-7.87(2H,m).

IR(CHCl₃): 3378, 3020, 2946, 2868, 2202, 1725, 1612, 1589, 1484, 1454, 1315, 1253,
1161/cm.

[α]_D²⁰ = +8.9° (CHCl₃, c=1.00, 22°C). mp. 68-70°C

No. 1a - 8 3

CDCl₃ 300MHz
 0.97-1.99(14H,m), 2.17(1H,m), 2.23(2H,t, J=6.9Hz), 2.99(1H,m), 5.20-5.23(2H,m), 5.37(1H,d, J=6.9Hz), 6.45(2H,br), 6.71-6.76(2H,m), 7.19(1H,dd, J=7.8, 6.6Hz), 7.37(1H,m), 7.62(2H,d, J=8.4Hz), 7.85(2H,d, J=8.4Hz).
 IR(CHCl₃): 3473, 3378, 3360, 3023, 2950, 2868, 2204, 1708, 1612, 1589, 1484, 1454, 1396, 1316, 1160/cm.
 [α]_D²⁰ = +17.1° (CHCl₃, c=1.01).

No.1a - 8 4
 CDCl₃ 300MHz
 1.00-2.08(14H,m), 2.21(1H,m), 2.37(2H,t, J=6.9Hz), 3.06(1H,m), 3.36(3H,s), 5.2-5.33(2H,m), 5.45(1H,d, J=6.6Hz), 6.91-6.94(2H,m), 7.56-7.59(2H,m), 7.81(1H,d,t, J=8.1Hz), 8.04(1H,d,d, J=8.1 & 1.8Hz), 8.57(1H,d, J=2.1Hz).
 IR(CHCl₃): 3492, 3254, 3028, 2954, 2902, 1708, 1597, 1512, 1344, 1291, 1250/cm.
 [α]_D²⁰ = +27.4° (CHCl₃, c=0.53, 23°C).

No.1a - 8 5
 CDCl₃ 300MHz
 0.96-2.06(14H,m), 2.20(1H,m), 2.35(2H,t, J=6.9Hz), 2.99(1H,m), 3.34(2H,s), 5.2-5.31(2H,m), 6.69(2H,d, J=6.7Hz), 7.19(1H,brs), 7.29(1H,brs), 7.45-7.50(2H,m).
 IR(CHCl₃): 3476, 3378, 3020, 2950, 2868, 2202, 1708, 1606, 1511, 1421, 1311, 1287, 1246, 1155/cm.
 [α]_D²⁰ = +17.1° (CHCl₃, c=1.00, 23°C).

No.1a - 8 6
 CDCl₃ 300MHz
 1.03-2.05(14H,m), 2.21(1H,m), 2.37(2H,t, J=6.9Hz), 3.04(1H,m), 5.29-5.33(2H,m), 5.57(1H,d, J=6.3Hz), 6.84-6.87(2H,m), 7.50-7.53(2H,m), 7.79(1H,d, J=8.1Hz), 8.08(1H,d,d, J=1.5 and 5.1Hz), 8.57(1H,d, J=1.5Hz).
 IR(CHCl₃): 3250, 3034, 2950, 2868, 2200, 1707, 1515, 1344, 1271, 1166, 1143/cm.
 [α]_D²⁰ = +21.3° (CHCl₃, c=0.26, 23°C).

No.1a - 8 7
 CD₃OD 300MHz
 1.04-2.00(14H,m), 2.18(1H,m), 2.26(2H,t, J=5.4Hz), 2.98(1H,m), 5.19-5.24(2H,m), 6.77-6.80(2H,m), 7.05(1H,d,d, J=2.1 and 8.1Hz), 7.22(1H,d, J=2.1Hz), 7.38-7.42(2H,m).
 IR(CHCl₃): 3377, 2952, 2878, 2204, 1705, 1607, 1515, 1425, 1312, 1267, 1222, 1162/cm.
 [α]_D²⁰ = -16.6° (CH₃OH, c=1.02, 23°C).

No.1a - 8 8
 CDCl₃ 300MHz
 0.90-1.96(14H,m), 2.22-2.31(2H,m), 2.95(1H,m), 3.65(3H,s), 4.87(1H,d, J=6.6Hz), 5.13-5.23(2H,m), 7.46-7.62(2H,m), 7.82-7.89(4H,m), 7.90-7.96(2H,m), 8.42(1H,brs).
 IR(CHCl₃): 3376, 3016, 2946, 2868, 1720, 1677, 1592, 1514, 1496, 1429, 1376, 1314, 1241, 1156, 1094 /cm.
 [α]_D²⁰ = -10.7° (CHCl₃, c=1.04, 23.0°C) mp. 134-136°C

No.1a - 8 9
 CDCl₃+CD₃OD 300MHz
 0.96-2.08(14H,m), 2.23(1H,m), 2.28(2H,t, J=7.2Hz), 2.89(1H,m), 5.20-5.32(2H,m), 7.46-7.62(2H,m), 7.82-7.97(2H,m).
 IR(KBr): 3272, 3007, 2952, 2874, 1703, 1660, 1592, 1527, 1498, 1433, 1400, 1317, 1260, 1152, 1094 /cm.
 [α]_D²⁰ = -24.4° (CH₃OH, c=1.02, 25.0°C).

No.1a - 9 0

CDCl₃ 300MHz

0.89-1.96(14H,m),2.25-2.83(8H,m),2.92(1H,m),3.67(3H,s),4.85(1H,d,J=6.3H
s),5.10-5.25(2H,m),7.81-7.90(4H,m),8.10-8.16(2H,m),8.81-8.40(2H,m),8.77(1
H,s).

IR(CHCl₃):8372,8018,2946,2868,1718,1655,1592,1527,1436,1397,1346,1318,
1256,1154,1099 /cm.

[α]_D = -16.1° (CHCl₃, c=1.00, 23.0°C).

No.1a - 9 1

CDCl₃+CD₃OD 300MHz

0.94-2.02(14H,m),2.18-2.36(8H,m),2.87(1H,m),5.15-5.30(2H,m),7.62-7.92(4
H,m),8.09-8.16(3H,m),8.30-8.37(2H,m).

IR(KBr):8284,8112,8006,2952,2874,1707,1593,1528,1498,1399,1348,1320,1
259,1153,1098 /cm.

[α]_D = -26.3° (CH₃OH, c=1.01, 22°C).

No.1a - 9 2

CDCl₃ 300MHz

0.93-1.95(14H,m),2.22-2.31(8H,m),2.98(1H,m),3.68(3H,s),5.07(1H,d,J=6.9H
s),5.10-5.24(2H,m),7.18(1H,m),7.36-7.48(2H,m),7.70(2H,d,J=7.8Hz),7.88-8.
05(4H,m),8.50(1H,brs).

IR(CHCl₃):3382,3008,2952,1720,1675,1599,1525,1499,1488,1321,1252,1161,
1087 /cm.

[α]_D = -18.6° (CHCl₃, c=1.03, 24.0°C) mp.100-101°C

No.1a - 9 3

CDCl₃+CD₃OD 300MHz

0.96-2.00(14H,m),2.18-2.35(8H,m),2.90(1H,m),5.15-5.30(2H,m),7.18(1H,m),
7.33-7.42(2H,m),7.65-7.74(2H,m),7.90-8.08(4H,m).

IR(KBr):8247,8194,8011,2965,2875,1706,1650,1602,1544,1489,1448,1325,
1265,1165,1091 /cm.

[α]_D = -19.4° (CH₃OH, c=1.00, 24.0°C) mp.158-159°C

No.1a - 9 4

CD₃OD 300MHz

1.05-2.00(14H,m),2.14(1H,m),2.28(2H,t,J=7.2Hz),2.98(1H,m),3.80(3H,s),5.1
3-5.27(2H,m),6.88-6.98(2H,m),7.54-7.64(2H,m),7.94-8.12(4H,m).

IR(KBr):3370,3006,2952,1708,1649,1604,1541,1512,1480,1441,1414,1328,1
302,1248,1162,1107,1090,1082/cm.

[α]_D = -19.1° (CH₃OH, c=1.01, 24°C).

No.1a - 9 5

CD₃OD 300MHz

1.04-2.02(14H,m),2.14(1H,m),2.23(2H,t,J=7.2Hz),2.98-3.02(7H,m),5.13-5.27
(2H,m),6.82-6.92(2H,m),7.51-7.59(2H,m),7.95-8.03(2H,m),8.04-8.11(2H,m).

IR(KBr):3370,3006,2953,1708,1649,1604,1541,1512,1480,1441,1414,1328,1
302,1248,1162,1107,1090,1082/cm.

[α]_D = -17.6° (CH₃OH, c=1.01, 24°C).

No.1a - 9 6

CD₃OD 300MHz

1.03-2.02(14H,m),2.14(1H,m),2.23(2H,t,J=7.2Hz),2.98(1H,m),5.13-5.27(2H,
m),6.75-6.84(2H,m),7.43-7.52(2H,m),7.94-8.12(4H,m).

IR(KBr):3389,3197,2953,2875,1707,1644,1606,1541,1514,1446,1328,1292,1
259,1240,1225,1161,1091/cm.

[α]_D = -18.7° (CH₃OH, c=1.00, 24°C) mp.193-194°C

No.1a - 97

d_6 -DMSO 300MHz

1.05-2.08(16H,m),2.15(3H,t,J=7.5Hz),2.89(1H,m),5.15-5.23(2H,m),6.78-7.12(3H,m),7.78(1H,d,d,J=1.4 Hz(7.8Hz),7.91-7.98(3H,m),8.14(2H,d,J=8.4Hz),9.71(1H,s).

IR(KBr):3407,3191,2953,1711,1646,1614,1603,1537,1457,1328,1162,1151/cm.

$[\alpha]_D^{20} = -20.7^\circ$ (CH_3OH , c=1.01, 21°C).

No.1a - 98

$CDCl_3$ 300MHz

0.93-2.00(14H,m),2.21(1H,m),2.81(2H,t,J=7.2Hz),2.93(1H,m),3.84(3H,s),3.85(6H,s),5.15-5.30(2H,m),5.45(1H,d,J=8.3Hz),7.04(2H,s),7.78-7.88(2H,m),7.90-7.98(2H,m),8.58(1H,s).

IR($CHCl_3$):3264,3005,2954,2874,1707,1670,1607,1537,1508,1451,1421,1308,1158,1129,1088/cm.

$[\alpha]_D^{20} = -7.2^\circ$ ($CHCl_3$, c=1.01, 23.5°C), mp.147-149°C.

No.1a - 99

CD_3OD 300MHz

1.04-1.98(14H,m),2.21(1H,m),2.10(2H,t,J=7.2Hz),2.95(1H,m),3.76(3H,s),3.86(6H,s),5.07-5.24(2H,m),7.19(2H,s),7.99(2H,d,J=8.7Hz),8.13(1H,d,J=8.7Hz).

IR(KBr):3354,3002,2950,2874,1656,1607,1570,1508,1452,1413,1314,1283,1165,1157,1127,1092/cm.

$[\alpha]_D^{20} = -20.5^\circ$ (CH_3OH , c=1.00, 23.5°C).

No.1a - 100

$CDCl_3$ 300MHz

1.14-1.97(14H,m),2.19(1H,m),2.28(2H,t,J=7.4Hz),3.04(1H,m),3.69(3H,s),5.03(1H,d,J=8.9Hz),5.15-5.29(2H,m),7.68(2H,d,J=8.4Hz),7.87(1H,s),7.98(2H,d,J=8.4Hz).

IR($CHCl_3$):3386,3271,3025,3015,2955,2877,1755,1712,1608,1331,1162/cm.

$[\alpha]_D^{20} = -29.4^\circ$ (CH_3OH , c=1.01, 25°C).

No.1a - 101

d_6 -DMSO

1.00-2.20(17H,m),2.84(1H,m),5.00-5.20(2H,m),7.78(2H,d,J=8.2Hz),7.84(1H,s),7.89-7.95(3H,m).

IR(KBr):3269,3065,3008,2952,2874,2768,1746,1707,1607,1322,1157 /cm.

$[\alpha]_D^{20} = -24.2^\circ$ (CH_3OH , c=1.01, 25°C).

No.1a - 102

CD_3OD

1.00-2.25(17H,m),2.92(1H,s),3.64(3H,s),5.07-5.21(2H,m),7.53(1H,s),7.77(3H,d,J=8.6Hz),7.90(2H,d,J=8.6).

IR(KBr):3420,3277,3006,2952,2873,1730,1657,1620,1571,1438,1312,1156 /cm.

$[\alpha]_D^{20} = -27.3^\circ$ (CH_3OH , c=0.51, 26°C), mp 230-232°C.

No.1a - 103

$CDCl_3$ 300MHz

0.94-1.98(14H,m),2.19(1H,m),2.28(2H,t,J=7.2Hz),3.04(1H,m),3.69(3H,s),5.11(1H,d,J=8.6Hz),5.15-5.29(2H,m),7.60(2H,d,J=8.4Hz),7.87(1H,s),7.98(2H,d,J=8.4Hz).

IR($CHCl_3$):3381,3021,2955,2876,1735,1605,1437,1411,1325,1231,1177 /cm.

$[\alpha]_D^{20} = +8.6^\circ$ ($CHCl_3$, c=1.00, 23°C).

No.1 - 104

CDCl₃ 300MHz

0.94-1.98(14H,m),2.31(1H,m),2.31(2H,t,J=6.5Hz),2.99(1H,m),5.18-5.28(2H,m),5.45(1H,d,J=6.6Hz),7.51(2H,d,J=8.7Hz),7.67(1H,s),7.99(2H,d,J=8.7Hz).
IR(CHCl₃):3382,3222,3028,3019,2957,2878,1738,1709,1604,1412,1322,1301,1288,1179,1162 /cm.

[α]_D²⁰ = +10.4° (CHCl₃, c=1.00, 23°C).

No.1a - 105

CDCl₃ 300MHz

0.92-1.98(14H,m),2.17(1H,m),2.26(2H,d,J=7.5Hz),3.01(1H,m),3.69(3H,s),4.01(3H,s),4.84(1H,d,J=6.3Hz),5.14-5.30(2H,m),7.71(2H,d,J=8.7Hz),7.87(2H,d,J=8.7Hz),8.09(1H,s).

IR(CHCl₃):3385,3284,3025,3015,2954,2877,2821,1780,1598,1459,1438,1403,1341,1160,1052 /cm.

[α]_D²⁰ = +3.6° (CHCl₃, c=1.00, 26°C).

No.1a - 106

CDCl₃ 300MHz

0.92-2.08(14H,m),2.14(1H,m),2.34(2H,d,J=7.2Hz),3.02(1H,m),4.01(3H,s),5.19(1H,d,J=6.9Hz),5.23-5.32(2H,m),7.71(2H,d,J=8.4Hz),7.88(2H,d,J=8.4Hz),8.09(1H,s).

IR(CHCl₃):3510,3384,3268,3028,3021,3014,2957,2877,2821,2667,2821,2666,1707,1598,1459,1404,1341,1324,1180,1052 /cm.

[α]_D²⁰ = +11.8° (CHCl₃, c=1.01, 25°C). mp 95-98°C

No.1a - 107

CDCl₃ 300MHz

0.92-1.97(14H,m), 1.84(3H,t,J=7.2Hz), 2.18(1H,m), 2.28(2H,d,J=7.4Hz), 3.01(1H,m), 3.68(3H,s), 4.26(2H,q,J=7.2Hz), 4.88(1H,d,J=6.6Hz), 5.15-5.29(2H,m), 7.71(2H,d,J=8.7Hz), 7.87(2H,d,J=8.7Hz), 8.09(1H,s).
IR(CHCl₃): 3385, 3282, 3025, 3026, 3015, 2954, 2877, 1729, 1599, 1480, 1458, 1438, 1403, 1388, 1181 /cm.
[α]_D = +4.4° (CHCl₃, c=1.00, 25°C).

No.1a - 108

CDCl₃, 300MHz

0.90-2.04(14H,m), 1.84(3H,t,J=7.2Hz), 2.14(1H,m), 2.34(2H,d,J=7.1Hz), 3.01(1H,m), 4.27(2H,q,J=7.2Hz), 5.20(1H,d,J=6.6Hz), 5.21-5.35(2H,m), 7.71(2H,d,J=8.4Hz), 7.88(2H,d,J=8.4Hz), 8.10(1H,s).
IR(CHCl₃): 3514, 3384, 3270, 3025, 3015, 3016, 2957, 2877, 1708, 1599, 1458, 1403, 1324, 1324, 1160, 1050 /cm.
[α]_D = +12.7° (CHCl₃, c=1.00, 25°C).

No.1a - 109

[α]_D = +8.5° (CHCl₃, c=1.00, 25°C). mp 109.0-111.0°C

No.1a - 110

CDCl₃:CD₃OD(95:5)

0.92-2.06(14H,m), 2.20(1H,m), 2.30(2H,d,J=7.2Hz), 2.99(1H,m), 5.22-5.33(2H,m), 7.54-7.66(3H,m), 8.07(2H,d,J=9.0Hz), 8.12-8.20(2H,m), 8.29(2H,d,J=9.0Hz).
IR(Nujol): 3270, 2956, 2924, 2854, 1716, 1648, 1485, 1319, 1167/cm.
[α]_D = +17.0° (CHCl₃, c=1.00, 25°C). mp 168.5-169°C

No.1a - 111

[α]_D = +2.6° (CHCl₃, c=1.00, 24°C). mp 120.0-121.0°C

No.1a - 112

CDCl₃, 300MHz

0.96-2.04(14H,m), 2.19(1H,m), 2.33(2H,d,J=7.1Hz), 3.07(1H,m), 5.28-5.31(2H,m), 5.33(1H,d,J=6.6Hz), 7.54-7.63(3H,m), 8.05(2H,d,J=8.4Hz), 8.18-8.23(2H,m), 8.41(2H,d,J=8.4Hz).
IR(CHCl₃): 3384, 3269, 3025, 3015, 2957, 2877, 1708, 1598, 1496, 1457, 1417, 1326, 1164 /cm.
[α]_D = +12.2° (CHCl₃, c=1.00, 24°C). mp 163-164°C

No.1a - 113

[α]_D = +22.1° (CHCl₃, c=1.05, 25°C). mp 90-92°C

No.1a - 114

[α]_D = +2.2° (CHCl₃, c=1.02, 25°C).

No.1a - 115

CDCl₃, 300MHz

0.90-1.98(14H,m), 2.15-2.22(1H,m), 2.27(2H,t,J=7.2Hz), 2.95-3.04(1H,m), 3.68(3H,s), 4.04(2H,s), 4.85(1H,d,J=6.6Hz), 5.10-5.27(2H,m), 7.12-7.34(7H,m), 7.76-7.82(2H,m).
IR(CHCl₃): 3384, 3026, 2952, 1727, 1595, 1493, 1486, 1318, 1165, 1091, 890/cm.
[α]_D = 0°
[α]_{me} = +4.9 ± 0.4° (CHCl₃, c=1.05, 23°C)

No.1a - 116

CDCl₃, 300MHz

0.90-2.10(14H,m), 2.10-2.18(1H,m), 2.32(2H,t,J=7.2Hz), 2.96-3.04(1H,m),

4.04(2H,s), 5.14(1H,d,J=8.6Hz), 5.18-5.23(2H,m), 7.12-7.34(7H,m), 7.78-7.82(2H,m).

IR(CHCl₃): 3280, 3020, 2950, 1709, 1407, 1318, 1154, 1091, 892/cm.

[α]_D²⁰ = +9.1 ± 0.5° (CHCl₃, c = 1.04, 25°C)

No. 1a - 117

CDCl₃, 300MHz

0.98-2.18(17H,m), 2.89-2.92(1H,m), 4.06(2H,s), 4.95-5.22(2H,m), 7.15-7.42(7H,m), 7.75-7.81(2H,m).

IR(KBr): 3439, 3279, 2951, 2872, 1662, 1494, 1453, 1408, 1318, 1155, 1093, 1057/cm.

[α]_D²⁰ = -16.3 ± 0.5° (CH₃OH, c = 1.06, 25°C)

No. 1a - 118

CDCl₃, 300MHz

0.98-1.70(15H,m), 1.80-2.00(5H,m), 2.30-2.40(2H,m), 2.92(1H,m), 4.06(2H,s), 4.72(1H,d,J=8.8Hz), 5.00-5.23(3H,m), 7.18(2H,d,J=8.4Hz), 7.26-7.38(5H,m), 7.79(2H,d,J=8.1Hz).

IR(CHCl₃): 3376, 3020, 2948, 2888, 1716, 1596, 1492, 1453, 1407, 1318, 1155, 1105/cm.

[α]_D²⁰ = +2.4° (CHCl₃, c = 1.08, 24°C).

No. 1a - 119

CDCl₃, 300MHz

0.90-2.02(14H,m), 2.20(1H,m), 2.29(2H,t,J=7.2Hz), 3.00(1H,m), 3.68(3H,s), 4.86(1H,d,J=6.9Hz), 5.18-5.34(2H,m), 7.00-7.09(4H,m), 7.22(1H,m), 7.37-7.45(2H,m), 7.79-7.88(2H,m).

IR(CHCl₃): 3276, 3018, 2945, 2868, 1727, 1582, 1486, 1321, 1248, 1151, 1093 /cm.

[α]_D²⁰ = +4.5° (CHCl₃, c = 1.05, 25.5°C).

No. 1a - 120

CD₂OD, 300MHz

1.00-2.00(14H,m), 2.18(2H,t,J=7.5Hz), 2.16(1H,m), 2.91(1H,m), 5.05-5.23(2H,m), 7.04-7.11(4H,m), 7.18-7.25(1H,m), 7.38-7.48(2H,m), 7.80-7.87(2H,m).

IR(KBr): 3430, 3276, 3006, 2952, 2878, 1683, 1487, 1410, 1322, 1298, 1245, 1152, 1095 /cm.

[α]_D²⁰ = -8.8° (CH₃OH, c = 1.05, 25.0°C).

No. 1a - 121

CDCl₃, 300MHz

0.90-2.10(14H,m), 2.15(1H,m), 2.25(2H,t,J=7.2Hz), 3.01(1H,m), 5.20(1H,d,J=6.9Hz), 5.22-5.35(2H,m), 7.00-7.09(4H,m), 7.18-7.25(1H,m), 7.37-7.45(2H,m), 7.79-7.88(2H,m).

IR(CHCl₃): 3280, 3020, 2948, 2868, 1708, 1582, 1486, 1409, 1321, 1296, 1248, 1151, 1093 /cm.

[α]_D²⁰ = +18.1° (CHCl₃, c = 1.04, 24.0°C).

No. 1a - 122

CDCl₃, 300MHz

0.90-2.00(14H,m), 2.28(1H,m), 2.28(2H,t,J=7.5Hz), 2.96(1H,m), 3.67(3H,s), 4.89(1H,d,J=6.6Hz), 5.18-5.32(2H,m), 5.22(1H,s), 5.98-7.40(5H,m), 7.30-7.38(2H,m), 7.68-7.74(2H,m).

IR(CHCl₃): 3416, 3270, 3018, 2946, 2868, 1725, 1587, 1503, 1487, 1400, 1320, 1149, 1094 /cm.

[α]_D²⁰ = +6.2° (CHCl₃, c = 1.04, 25.0°C).

No. 1a - 123

CDCl₃, 300MHz

0.90-2.04(14H,m),2.18(1H,m),2.28(2H,t,J=7.2Hz),2.98(1H,m),3.04-3.35(8H,m),6.98-7.12(8H,m),7.12-7.20(2H,m),7.25-7.38(2H,m),7.66-7.74(2H,m).
IR(CHCl₃):3424,3270,3028,2982,2872,1708,1587,1506,1445,1399,1320,1145,1092 /cm.
[α]_D²⁰ = +20.9° (CHCl₃, c=1.06, 25.0°C).

No.1a - 1 2 4

CDCl₃, 300MHz

0.90-2.00(14H,m),2.18(1H,m),2.28(2H,t,J=7.2Hz),3.00(1H,m),3.14(3H,s),3.68(3H,s),4.56(2H,s),4.84(1H,d,J=6.8Hz),5.10-5.29(2H,m),7.16-7.26(4H,m),7.26-7.34(2H,m),7.78-7.84(2H,m).
IR(CHCl₃):3384,3028,2952,2874,1727,1592,1501,1485,1410,1370,1329,1172,1148,1091 /cm.
[α]_D²⁰ = +2.7° (CHCl₃, c=1.09, 23.0°C).

No.1a - 1 2 5

CDCl₃, 300MHz

0.90-2.00(14H,m),2.18(1H,m),2.28(2H,t,J=7.2Hz),2.29(3H,s),3.00(1H,m),3.68(3H,s),4.04(2H,s),4.80(1H,d,J=6.6Hz),5.11-5.29(2H,m),6.99-7.08(2H,m),7.12-7.19(2H,m),7.81(2H,d,J=8.1Hz),7.79(2H,d,J=8.1Hz).
IR(CHCl₃):3382,3280,3024,2950,2874,1730,1596,1504,1485,1407,1367,1318,1196,1155,1091 /cm.
[α]_D²⁰ = +2.9° (CHCl₃, c=1.06, 23.0°C).

No.1a - 1 2 6

CDCl₃, 300MHz

0.90-2.02(14H,m),2.14(1H,m),2.29(3H,s),2.32(3H,t,J=7.2Hz),3.01(1H,m),4.08(2H,s),5.10(1H,d,J=6.6Hz),5.16-5.30(2H,m),6.98-7.06(2H,m),7.11-7.18(2H,m),7.80(2H,d,J=8.1Hz),7.79(2H,d,J=8.1Hz).
IR(CHCl₃):3374,3280,3020,2948,2868,1749,1708,1596,1504,1407,1369,1317,1195,1155,1091 /cm.
[α]_D²⁰ = +10.0° (CHCl₃, c=1.09, 23.0°C).

No.1a - 1 2 7

CDCl₃, 300MHz

0.87-1.95(14H,m),2.18-2.22(3H,m),2.95(1H,m),3.69(3H,s),3.96(2H,s),4.79(1H,d,J=6.6Hz),4.97-5.17(2H,m),5.54(1H,s),6.75-6.89(2H,m),6.97-7.05(2H,m),7.25-7.33(2H,m),7.75-7.81(2H,m).
IR(CHCl₃):3382,3028,2950,2874,1722,1595,1511,1436,1407,1317,1257,1154,1090 /cm.
[α]_D²⁰ = -2.1° (CHCl₃, c=1.00, 21.5°C).

No.1a - 1 2 8

CDCl₃, 300MHz

0.85-2.02(14H,m),2.18(1H,m),2.31(2H,t,J=7.2Hz),2.96(1H,m),3.95(2H,s),5.05-5.27(2H,m),6.75-6.82(2H,m),6.96-7.04(2H,m),7.25-7.32(2H,m),7.74-7.81(2H,m).
IR(CHCl₃):3362,3020,2948,2868,1708,1596,1511,1407,1316,1242,1154,1091 /cm.
[α]_D²⁰ = +4.8° (CHCl₃, c=1.04, 22°C).

No.1a - 1 2 9

CDCl₃, 300MHz

0.89-1.98(14H,m),2.18(1H,m),2.27(2H,t,J=7.2Hz),2.99(1H,m),3.68(3H,s),3.79(3H,s),3.98(2H,s),4.81(1H,d,J=6.8Hz),5.10-5.27(2H,m),6.81-6.87(2H,m),7.03-7.10(3H,m),7.25-7.32(2H,m),7.75-7.82(2H,m).
IR(CHCl₃):3382,3276,3006,2950,2874,1728,1609,1509,1457,1436,1407,1316,1244,1164,1091,1038 /cm.

$[\alpha]_D^{25} = +19.3^\circ$ (CHCl_3 , $c=1.05$, 23°C).

No.1a - 130

CDCl_3 , 300MHz

0.90-2.00(14H,m), 2.20(1H,m), 2.80(2H,t, $J=7.2\text{Hz}$), 2.98(1H,m), 3.59(3H,s), 4.81(1H,d, $J=6.6\text{Hz}$), 5.12-5.82(2H,m), 5.46(1H,brs), 6.84-7.01(6H,m), 7.76-7.88(2H,m)

IR(CHCl_3): 3380, 3284, 3024, 2952, 2874, 1724, 1585, 1504, 1488, 1486, 1321, 1296, 1149, 1091/cm.

$[\alpha]_D^{25} = +28.9^\circ$ (CHCl_3 , $c=1.01$, 23°C).

No.1a - 131

CDCl_3 , 300MHz

0.92-2.10(14H,m), 2.18(1H,m), 2.34(2H,t, $J=6.9\text{Hz}$), 2.96(1H,m), 3.18-5.35(3H,m), 6.84-7.01(6H,m), 7.75-7.83(2H,m).

IR(CHCl_3): 3270, 3028, 2952, 2874, 1708, 1589, 1505, 1489, 1456, 1322, 1297, 1288, 1148, 1091/cm.

$[\alpha]_D^{25} = +7.7^\circ$ (CHCl_3 , $c=1.09$, 24°C).

No.1a - 132

CDCl_3 , 300MHz

0.91-2.02(14H,m), 2.19(1H,m), 2.29(2H,t, $J=7.2\text{Hz}$), 2.99(1H,m), 3.68(3H,s), 4.83(3H,s), 4.82(1H,d, $J=6.6\text{Hz}$), 5.14-5.38(2H,m), 6.90-7.04(6H,m), 7.76-7.88(2H,m).

IR(CHCl_3): 3384, 3006, 2952, 2874, 1727, 1589, 1502, 1488, 1459, 1436, 1321, 1295, 1281, 1150, 1092, 1088/cm.

$[\alpha]_D^{25} = +3.1^\circ$ (CHCl_3 , $c=1.01$, 23°C).

No.1a - 133

TLC Rf=0.21 (에틸아세테이트/n-헥산 = 1:1 (0.8% 아세트산.))

No.1a - 134

CDCl_3 , 300MHz

0.97-2.10(14H,m), 2.20(1H,m), 2.38(2H,t, $J=6.9\text{Hz}$), 3.04(1H,m), 3.23-5.33(2H,m), 5.41(1H,d, $J=6.6\text{Hz}$), 7.02(1H,d, $J=9.0\text{Hz}$), 7.09-7.18(2H,m), 7.26-7.32(1H,m), 7.43-7.49(2H,m), 7.92(1H,d,d, $J=2.4$ 및 9.0Hz), 8.46(1H,d, $J=2.4\text{Hz}$).

IR(CHCl_3): 3284, 3270, 3020, 2952, 1708, 1610, 1587, 1537, 1479, 1352, 1271, 1252, 1167/cm.

$[\alpha]_D^{25} = +20.9^\circ$ (CHCl_3 , $c=0.51$, 22°C).

No.1a - 135

CDCl_3 , 300MHz

0.96-2.02(14H,m), 2.21(1H,m), 2.29(2H,t, $J=7.2\text{Hz}$), 3.07(1H,m), 3.68(3H,s), 5.04(1H,d, $J=6.9\text{Hz}$), 5.16-5.33(2H,m), 7.48-7.55(2H,m), 7.64(1H,m), 7.76-7.82(2H,m), 7.88-7.94(2H,m), 7.98-8.04(2H,m).

IR(CHCl_3): 3284, 3282, 3026, 2952, 2874, 1727, 1662, 1596, 1448, 1398, 1316, 1274, 1163, 1090 /cm.

$[\alpha]_D^{25} = +3.1^\circ$ (CHCl_3 , $c=1.03$, 22.0°C).

No.1a - 136

CDCl_3 , 300MHz

0.95-2.05(14H,m), 2.19(1H,m), 2.34(2H,t, $J=7.2\text{Hz}$), 3.03(1H,m), 3.10-5.40(2H,m), 5.35(1H,d, $J=6.8\text{Hz}$), 7.45-7.58(2H,m), 7.64(1H,m), 7.74-7.84(2H,m), 7.84-7.96(2H,m), 7.95-8.06(2H,m).

IR(CHCl_3): 3260, 3012, 2950, 2870, 1708, 1662, 1595, 1446, 1395, 1316, 1274, 1162, 1090 /cm.

$[\alpha]_D^{25} = +12.9^\circ$ (CHCl_3 , $c=1.05$, 21.5°C).

No.1a - 137

CDCl₃, 800MHz

0.97-2.04(14H,m),2.37(1H,m),2.31(2H,t,J=7.2Hz),3.07(1H,m),3.70(3H,s),5.15-5.30(3H,m),7.48-7.68(5H,m),7.96-8.02(2H,m).

IR(CHCl₃):3382,3080,2953,2875,1726,1446,1323,1154,1098 /cm.

[α]_D²⁰ = -13.1° (CHCl₃, c=1.08, 22.0°C).

No.1a - 138

CDCl₃, 800MHz

0.95-2.04(14H,m),2.25(1H,m),2.35(2H,t,J=7.2Hz),3.08(1H,m),3.15-3.34(2H,m),3.41(1H,d,J=6.6Hz),7.48-7.68(5H,m),7.98-8.03(2H,m).

IR(CHCl₃):3370,3242,3023,2950,2870,1707,1445,1408,1323,1154,1099 /cm.

[α]_D²⁰ = -0.6° (CHCl₃, c=1.06, 21.5°C) [α]₄₃₅²⁰ = +30.7° (CHCl₃, c=1.06, 21.5°C).

No.1a - 139

CDCl₃, 800MHz

0.92-2.19(14H,m),2.27-2.34(3H,m),3.28(1H,m),3.45(3H,s),4.28(2H,s),4.37(1H,d,J=7.4Hz),5.34-5.50(3H,m),7.37-7.62(5H,m).

IR(CHCl₃):3389,3294,3028,3015,2954,2877,1730,1600,1488,1325,1151,1129 /cm.

[α]_D²⁰ = -24.8° (CHCl₃, c=1.01, 24°C).

No.1a - 140

CDCl₃, 800MHz

0.92-2.32(15H,m),2.34(2H,t,J=7.1Hz),3.24(1H,m),4.29(2H,s),4.81(1H,d,J=7.4Hz),5.32-5.52(3H,m),7.36-7.62(5H,m).

IR(CHCl₃):3510,3388,3251,3031,3015,2956,2877,2868,1708,1601,1488,1318,1151,1129 /cm.

[α]_D²⁰ = -24.8° (CHCl₃, c=1.02, 25°C).

No.1a - 1 4 1

CDCl₃, 800MHz

0.82-2.19(15H,m), 2.82(2H,t,J=7.2Hz), 3.26(1H,m), 3.65(3H,s), 4.31(2H,s), 4.48
(1H,d,J=7.4Hz), 5.33-5.49(2H,m), 7.42-7.80(8H,m).

IR(CHCl₃): 3388, 3285, 3018, 2955, 2877, 2225, 1730, 1597, 1479, 1320, 1152, 1129
/cm.

[α]_D²⁰ = -20.1° (CHCl₃, c=0.98, 25°C).

No.1a - 1 4 2

CDCl₃, 800MHz

0.82-2.22(15H,m), 2.85(2H,t,J=6.8Hz), 3.26(1H,m), 4.32(2H,s), 4.86(1H,d,J=7.
4Hz), 5.33-5.58(2H,m), 7.48-7.80(8H,m).

IR(CHCl₃): 3512, 3388, 3258, 3031, 3023, 3014, 2956, 2877, 2225, 1708, 1597, 147
9, 1319, 1151, 1128 /cm.

[α]_D²⁰ = -19.8° (CHCl₃, c=1.09, 23°C).

No.1a - 1 4 3

CDCl₃, 800MHz

1.00-1.93(14H,m), 2.17(1H,m), 2.27(2H,t,J=7.2Hz), 3.07(1H,m), 5.17-5.22(2H,
m), 5.36(1H,d,J=6.9Hz), 7.77(1H,d,J=9.0Hz), 8.11-8.17(2H,m), 8.36(1H,d,d,J=2.1
H, 2.0Hz), 8.51(1H,d,J=1.8Hz), 8.65(1H,d,J=2.1Hz).

IR(CHCl₃): 3382, 3266, 3026, 2954, 2874, 1708, 1632, 1585, 1528, 1458, 1419, 1345,
1158/cm.

[α]_D²⁰ = +7.6° (CHCl₃, c=1.04, 22°C).

No.1a - 1 4 4

CDCl₃, 800MHz

0.95-1.90(14H,m), 2.17(1H,m), 2.25(2H,t,J=7.5Hz), 3.02(1H,m), 5.09(1H,d,J=6.

6H_a), 5.15-5.21(2H, m), 6.72(1H, d, J=8.4Hz), 6.85(1H, s), 7.54(1H, d, J=8.4Hz), 7.72(1H, d, J=9.0Hz), 7.83(1H, d, d, J=1.8 且 9.0Hz), 8.52(1H, d, J=1.6Hz).
 IR(CHCl₃): 3380, 3260, 3022, 2948, 2888, 2852, 1708, 1688, 1460, 1425, 1312, 1291, 1285, 1148, 1120/cm.
 [α]_D²⁰ = +12.9° (CHCl₃, c=1.02, 22.5°C).

No.1a - 1 4 5
 CDCl₃, 300MHz
 0.97-1.90(14H, m), 2.15(1H, m), 2.27(2H, t, J=6.5Hz), 3.02(1H, m), 3.08(6H, s), 5.12(1H, d, J=8.8Hz), 5.19-5.25(2H, m), 6.78-6.84(2H, m), 7.53(1H, d, J=8.7Hz), 7.76-7.83(2H, m), 8.30(1H, d, J=1.8Hz).
 IR(CHCl₃): 3272, 3030, 2950, 2874, 1708, 1685, 1601, 1511, 1457, 1425, 1357, 1328, 1151, 1124/cm.
 [α]_D²⁰ = +6.3° (CHCl₃, c=1.04, 23°C).

No.1a - 1 4 6
 CDCl₃, 300MHz
 0.95-2.00(14H, m), 2.16(1H, m), 2.29(2H, t, J=7.2Hz), 3.05(1H, m), 4.10(3H, s), 5.13-5.28(2H, m), 5.88(1H, d, J=8.9Hz), 7.67-7.74(2H, m), 8.08(1H, d, d, J=1.8 且 9.0Hz), 8.11(1H, s), 8.61(1H, d, J=1.8Hz).
 IR(CHCl₃): 3280, 3020, 2948, 2888, 1708, 1639, 1606, 1528, 1470, 1455, 1424, 1349, 1311, 1288, 1174, 1149, 1120, 1079, 1060, 1022/cm.
 [α]_D²⁰ = +7.8° (CHCl₃, c=1.00, 23°C).

No.1a - 1 4 7
 CDCl₃, 300MHz
 0.92-1.92(14H, m), 2.17(1H, m), 2.25(2H, t, J=7.2Hz), 3.01(1H, m), 3.97(3H, s), 5.10-5.27(5H, m), 6.92(1H, s), 7.29(1H, s), 7.52(1H, d, J=8.7Hz), 7.82(1H, d, d, J=2.1 且 8.7Hz), 8.88(1H, d, J=2.1Hz).
 IR(CHCl₃): 3380, 3264, 3002, 2950, 2888, 1708, 1634, 1476, 1452, 1426, 1317, 1284, 1218, 1169, 1147, 1115, 1088, 1031/cm.
 [α]_D²⁰ = +5.6° (CHCl₃, c=1.02, 23°C).

No.1a - 1 4 8
 CDCl₃, 300MHz
 0.90-1.95(14H, m), 2.15(1H, m), 2.28(2H, t, J=6.5Hz), 2.91(6H, s), 3.03(1H, m), 4.01(3H, s), 5.15-5.26(3H, m), 7.19(1H, s), 7.89(1H, s), 7.89(1H, d, J=8.7Hz), 7.87(1H, d, d, J=2.1 且 8.7Hz), 8.40(1H, d, J=2.1Hz).
 IR(CHCl₃): 3284, 3266, 2956, 1709, 1632, 1602, 1495, 1478, 1458, 1430, 1317, 1291, 1148, 1121/cm.
 [α]_D²⁰ = +11.2° (CHCl₃, c=1.01, 23°C).

No.1a - 1 4 9
 CDCl₃, 300MHz
 0.99-1.90(14H, m), 2.17(1H, m), 2.28(2H, t, J=7.2Hz), 3.00(1H, m), 5.13-5.19(2H, m), 5.48(1H, d, J=6.0Hz), 7.02(1H, d, d, J=2.4 且 9.0Hz), 7.89-7.41(3H, m), 7.58(1H, d, J=8.7Hz), 7.96(1H, d, d, J=1.8 且 8.7Hz), 8.45(1H, d, J=1.8Hz).
 IR(CHCl₃): 3270, 3020, 2948, 2868, 1709, 1601, 1478, 1448, 1419, 1315, 1147, 1120/cm.
 [α]_D²⁰ = -11.4° (CHCl₃, c=1.01, 23°C).

No.1a - 1 5 0
 CDCl₃, 300MHz
 0.97-1.88(14H, m), 2.12-2.21(3H, m), 2.38(3H, s), 3.01(1H, m), 5.14-5.19(2H, m), 5.36(1H, d, J=6.6Hz), 7.24(1H, d, d, J=2.4 且 9.0Hz), 7.59(1H, d, J=6.3Hz), 7.66(1H, d, J=8.7Hz), 7.72(1H, d, J=2.4Hz), 8.01(1H, d, d, J=1.8 且 8.7Hz), 8.49(1H, d, J=1.8Hz).
 IR(CHCl₃): 3470, 3274, 3250, 3016, 2950, 2868, 1709, 1474, 1444, 1412, 1370, 1319,

1886, 1162, 1145, 1118/cm.

$[\alpha]_D^{25} = +4.9^\circ$ (CHCl₃, c=1.00, 24°C).

No. 1a - 151

CDCl₃, 800MHz

0.97-1.89(14H,m), 2.17(1H,m), 2.25(2H,t, J=7.2Hz), 3.03(1H,m), 3.22(3H,s), 5.15-5.20(2H,m), 5.32(1H,d, J=6.6Hz), 7.11(1H,d,d, J=2.4 Hz 9.3Hz), 7.45(1H,d, J=2.4Hz), 7.50(1H,d, J=9.8Hz), 7.62(1H,d, J=8.7Hz), 7.97(1H,d,d, J=2.1 Hz 8.7Hz), 8.50(1H,d, J=2.1Hz).

IR(CHCl₃): 3280, 3018, 2948, 1708, 1488, 1454, 1422, 1314, 1287, 1268, 1188, 1169, 1147/cm.

$[\alpha]_D^{25} = +4.9^\circ$ (CHCl₃, c=1.01, 23.5°C).

No. 1a - 152

CDCl₃, 300MHz

0.98-2.04(14H,m), 2.15(1H,m), 2.30(2H,t, J=8.6Hz), 3.04(1H,m), 5.17-5.29(3H,m), 7.41(1H,d,d, J=1.5 Hz 8.1Hz), 7.64-7.88(2H,m), 7.92(1H,d, J=3.4Hz), 8.00(1H,d,d, J=1.8 Hz 8.4Hz), 8.49(1H,d, J=1.6Hz).

IR(CHCl₃): 3266, 3028, 2952, 2872, 1707, 1629, 1591, 1486, 1416, 1318, 1275, 1150/cm.

$[\alpha]_D^{25} = +3.2^\circ$ (CHCl₃, c=1.04, 23°C).

No. 1a - 153

CDCl₃, 800MHz

0.97-1.88(14H,m), 2.16(1H,m), 2.28(2H,t, J=7.2Hz), 3.03(1H,m), 4.64-4.65(2H,m), 5.16-5.50(5H,m), 6.13(1H,m), 7.14(1H,d,d, J=2.7 Hz 9.0Hz), 7.46-7.52(2H,m), 7.63(1H,d, J=8.7Hz), 7.97(1H,d,d, J=1.8 Hz 8.7Hz), 8.49(1H,d, J=1.6Hz).

IR(CHCl₃): 3374, 3260, 3020, 2948, 2868, 1708, 1699, 1478, 1446, 1414, 1314, 1284, 1265, 1184, 1148, 1120/cm.

$[\alpha]_D^{25} = +5.8^\circ$ (CHCl₃, c=1.00, 23°C).

No. 1a - 154

CDCl₃, 800MHz

0.99-2.00(15H,m), 2.26(2H,t, J=7.2Hz), 3.03(1H,m), 4.07(3H,s), 5.25-5.27(2H,m), 5.36(1H,d, J=7.2Hz), 7.20(1H,s), 7.36-7.48(2H,m), 7.55-7.58(1H,m), 7.91-7.98(1H,m), 8.52(1H,s).

IR(CHCl₃): 3362, 3257, 3020, 2948, 2868, 1708, 1687, 1602, 1579, 1488, 1467, 1457, 1418, 1346, 1318, 1301, 1276, 1182, 1104/cm.

$[\alpha]_D^{25} = +19.4^\circ$ (CHCl₃, c=1.01, 25°C).

mp. 88-90°C

No. 1a - 155

CDCl₃, 800MHz

0.92-2.02(14H,m), 2.16(1H,m), 2.31(2H,t, J=7.2Hz), 3.01(1H,m), 4.10(2H,s), 5.10(1H,d, J=6.6Hz), 5.15-5.35(2H,m), 7.04-7.26(5H,m), 7.67-7.76(2H,m).

IR(CHCl₃): 3286, 3028, 2952, 2852, 2872, 1708, 1699, 1574, 1478, 1457, 1418, 1301, 1268, 1147, 1124, 1101, 1080/cm.

$[\alpha]_{25} = +33.4^\circ$ (CHCl₃, c=1.00, 23°C).

No. 1a - 156

CDCl₃, 800MHz

0.91-2.21(16H,m), 2.33(2H,t, J=6.9Hz), 3.01(1H,m), 5.11(1H,d, J=6.6Hz), 5.27-5.35(2H,m), 5.55-5.96(5H,m), 7.35(1H,d, J=2.1Hz), 7.42(1H,d,d, J=2.1 Hz 8.7Hz).

IR(CHCl₃): 3384, 3268, 2957, 1708, 1687, 1489, 1462, 1418, 1290, 1222, 1151, 1122/cm.

$[\alpha]_D^{25} = +6.4^\circ$ (CHCl₃, c=1.00, 23°C).

No. 1a - 157

CDCl₃, 300MHz
0.97-1.91(14H,m), 2.18(1H,m), 2.28(2H,t,J=8.9Hz), 2.04(1H,m), 5.18-5.28(2H,m), 7.52-7.64(2H,m), 7.88-8.00(2H,m), 8.25(1H,m), 8.69(1H,m).
IR(CHCl₃): 3382, 3268, 2952, 2874, 1707, 1457, 1425, 1409, 1318, 1152/cm.
[α]_D²⁰ = +4.4° (CHCl₃, c=1.02, 22°C).

No.1a - 158
CDCl₃, 300MHz
1.02-1.97(14H,m), 2.30(1H,m), 2.39(2H,t,J=7.2Hz), 2.06(1H,m), 5.19-5.24(2H,m), 5.58(1H,d,J=8.6Hz), 7.62(1H,m), 7.73(1H,m), 7.86-7.91(2H,m), 7.96(1H,d,J=7.5Hz), 8.04(1H,d,d,J=1.5 Hz 8.1Hz), 8.34(1H,d,J=1.2Hz).
IR(CHCl₃): 3490, 3280, 3020, 2950, 2870, 1707, 1466, 1398, 1312, 1155/cm.
[α]_D²⁰ = -8.8° (CHCl₃, c=1.00, 22°C).

No.1a - 159
CDCl₃, 300MHz
0.92-1.88(14H,m), 2.18(1H,m), 2.24(2H,m), 2.02(1H,m), 2.90(2H,s), 5.12-5.28(2H,m), 7.29-7.58(4H,m), 7.97(1H,d,d,J=1.8 Hz 7.5Hz), 8.13(1H,d,J=7.5Hz), 8.64(1H,d,J=1.8Hz).
IR(CHCl₃): 3382, 3266, 3018, 2956, 1708, 1629, 1594, 1476, 1467, 1325, 1245, 1227, 1158, 1146/cm.
[α]_D²⁰ = +14.6° (CHCl₃, c=1.00, 22°C).

No.1a - 160
CDCl₃, 300MHz
0.93-1.88(14H,m), 2.18-2.24(2H,m), 2.00(1H,m), 5.08-5.21(2H,m), 7.28-7.33(1H,m), 7.47-7.51(2H,m), 7.90(1H,d,d,J=1.5 Hz 7.3Hz), 8.10(1H,d,J=7.6Hz), 8.68-8.64(2H,m).
IR(CHCl₃): 3465, 3380, 3275, 3020, 2957, 2876, 1708, 1627, 1604, 1495, 1473, 1457, 1323, 1240, 1222, 1156, 1149/cm.
[α]_D²⁰ = +8.2° (CHCl₃, c=1.01, 22°C).

No.1a - 161
CDCl₃, 300MHz
0.98-1.88(14H,m), 2.17(1H,m), 2.24(2H,t,J=7.2Hz), 2.05(1H,m), 5.16-5.20(2H,m), 5.35(1H,d,J=6.6Hz), 7.40(1H,m), 7.55(1H,m), 7.83(1H,d,J=8.1Hz), 7.89(1H,d,d,J=1.5 Hz 8.1Hz), 8.01(1H,m), 8.06(1H,d,J=8.1Hz), 8.12(1H,d,J=1.5Hz).
IR(CHCl₃): 3478, 3266, 3028, 2952, 2874, 1708, 1454, 1417, 1323, 1196, 1143/cm.
[α]_D²⁰ = +21.9° (CHCl₃, c=1.01, 22°C).

No.1a - 162
CDCl₃, 300MHz
0.96-1.98(14H,m), 2.02(1H,m), 2.25(2H,t,J=7.2Hz), 2.05(1H,m), 4.10(2H,s), 5.14-5.25(2H,m), 5.41(1H,d,J=7.2Hz), 7.35-7.42(1H,m), 7.51-7.64(2H,m), 7.94-8.00(1H,m), 8.16(1H,s).
IR(CHCl₃): 3368, 3274, 3028, 2952, 2874, 1708, 1638, 1583, 1465, 1452, 1438, 1418, 1315, 1151, 1103, 1058, 1024/cm.
[α]_D²⁰ = +15.1° (CHCl₃, c=1.01, 22°C). mp. 108-110°C

No.1a - 163
d₆-DMSO 300MHz
0.97-1.84(14H,m), 1.92(1H,m), 2.04(2H,t,J=7.5Hz), 2.90(1H,m), 5.08-5.23(2H,m), 7.32(1H,s), 7.36-7.61(2H,m), 7.62(1H,s), 7.66-7.71(1H,m), 7.93(1H,s), 8.14-8.17(1H,m), 10.7(1H,s), 11.9(1H,s).
IR(KBr): 3350, 3295, 2952, 2874, 1707, 1636, 1601, 1466, 1431, 1389, 1315, 1251, 1174, 1146, 1106/cm.
[α]_D²⁰ = -25.3° (CH₃OH, c=1.01, 25°C). mp. 159-162°C

No.1a - 1 5 4

CDCl₃, 300MHz

0.98-1.96(17H,m), 2.05(1H,m), 2.26(2H,t,J=7.2Hz), 3.07(1H,m), 4.32(2H,q,J=7.2Hz), 5.19-5.23(2H,m), 5.31(1H,d,J=7.8Hz), 7.35(1H,m), 7.41-7.62(3H,m), 7.95(1H,m), 8.15(1H,s).

IR(CHCl₃): 3380, 3018, 2948, 2870, 1709, 1632, 1457, 1445, 1425, 1394, 1314, 1176, 1152, 1105/cm.

[α]_D²⁰ = +12.7° (CHCl₃, c=1.02, 25°C). mp. 106-109°C

No.1a - 1 5 5

CDCl₃, 300MHz

0.95-1.98(16H,m), 2.26(2H,t,J=7.5Hz), 3.04(1H,m), 4.15(3H,s), 5.20-5.26(2H,m), 5.34(1H,d,J=8.9Hz), 7.41-7.47(1H,m), 7.65-7.68(2H,m), 7.89-7.92(1H,m), 8.32(1H,s).

IR(CHCl₃): 3386, 3087, 3022, 2957, 1706, 1632, 1528, 1468, 1408, 1384, 1246, 1208, 1227, 1212, 1205, 1167/cm.

[α]_D²⁰ = +19.6° (CHCl₃, c=1.01, 25°C).

No.1a - 1 5 6

CDCl₃, 300MHz

0.97-2.03(16H,m), 2.27(2H,t,J=6.9Hz), 3.07(1H,m), 4.14(3H,s), 5.21-5.27(2H,m), 5.47(1H,d,J=8.9Hz), 7.64(1H,s), 7.72(1H,d,d,J=0.6 及 9.0Hz), 8.25(1H,s), 8.47(1H,d,d,J=2.4 及 9.0Hz), 8.94(1H,d,d,J=0.6 及 2.4Hz).

IR(CHCl₃): 3273, 2957, 1708, 1639, 1587, 1528, 1467, 1428, 1415, 1345, 1231, 1184, 1155/cm.

[α]_D²⁰ = +14.4° (CHCl₃, c=0.50, 25°C).

No.1a - 1 5 7

CDCl₃, 300MHz

0.92-2.00(14H,m), 2.15(1H,m), 2.27(2H,t,J=7.2Hz), 3.04(1H,m), 3.97(2H,s), 5.15-5.20(3H,m), 7.35-7.47(2H,m), 7.55-7.63(1H,m), 7.80-7.96(3H,m), 8.05(1H,d,J=0.8Hz).

IR(CHCl₃): 3260, 3020, 2945, 2868, 1707, 1451, 1413, 1319, 1172, 1144, 1101, 1071/cm.

[α]_D²⁰ = +18.2° (CHCl₃, c=1.04, 25°C).

No.1a - 1 5 8

CDCl₃, 300MHz

0.90-1.88(14H,m), 2.16(1H,m), 2.25(2H,t,J=6.9Hz), 3.00(1H,m), 5.00-5.19(2H,m), 5.35(1H,d,J=8.6Hz), 7.25-7.30(1H,m), 7.46-7.50(2H,m), 7.73(1H,d,d,J=1.5 及 8.1Hz), 8.08-8.14(3H,m), 8.93(1H,s).

IR(CHCl₃): 3466, 3380, 3276, 3016, 2957, 1706, 1630, 1498, 1458, 1324, 1241, 1150/cm.

[α]_D²⁰ = +18.0° (CHCl₃, c=1.00, 22°C).

No.1a - 1 5 9

CDCl₃, 300MHz

0.57-1.86(14H,m), 2.15(1H,m), 2.25(2H,t,J=6.9Hz), 2.98(1H,m), 3.89(2H,s), 5.00-5.22(2H,m), 5.27(1H,d,J=6.9Hz), 6.68(1H,d,d,J=2.1 及 13.4Hz), 6.94(1H,d,J=2.1Hz), 7.89(1H,d,d,J=1.5 及 7.8Hz), 7.92-8.01(3H,m), 8.83(1H,s).

IR(CHCl₃): 3465, 3378, 3278, 3022, 2957, 1708, 1630, 1609, 1569, 1459, 1433, 1314, 1281, 1229, 1151/cm.

[α]_D²⁰ = +19.3° (CHCl₃, c=1.01, 21°C).

No.1a - 1 7 0

CDCl₃, 300MHz

0.85-2.25(17H,m), 3.04(1H,m), 3.84(3H,s), 3.95(3H,s), 5.06-5.26(3H,m), 6.57-6.93(2H,m), 7.69(1H,d,d,J=1.6 及 3.2Hz), 7.93-9.05(3H,m).

IR(CHCl₃): 3026, 2957, 1708, 1480, 1601, 1460, 1331, 1243, 1224, 1152/cm.
[α]_D²⁰ = +17.3° (CHCl₃, c=1.00, 22°C).

No. 1a - 171

CDCl₃, 300MHz

0.95-2.00(14H, m), 2.16-2.32(3H, m), 2.66(2H, s), 3.14(1H, m), 3.69(2H, s), 5.09(1H, d, J=6.8Hz), 5.10-5.25(2H, m), 7.45(1H, d, d, J=1.8 Hz, 8.6Hz), 7.75-7.84(2H, m).
IR(CHCl₃): 2974, 2918, 2948, 2868, 1728, 1585, 1518, 1486, 1340, 1278, 1153, 1112/cm.

[α]_D²⁰ = -14.7° (CHCl₃, c=1.07, 25.0°C).

No. 1a - 172

CDCl₃, 300MHz

0.97-2.02(14H, m), 2.23(1H, m), 2.28(2H, t, J=7.2Hz), 2.66(2H, s), 3.14(1H, m), 5.12-5.22(2H, m), 5.41(1H, d, J=7.2Hz), 7.46(1H, d, d, J=2.1 Hz, 8.7Hz), 7.78(1H, d, J=8.7Hz), 7.78(1H, d, J=2.1Hz).
IR(CHCl₃): 3372, 3250, 3022, 2950, 2868, 1707, 1514, 1419, 1386, 1279, 1164, 1112/cm.

[α]_D²⁰ = -4.1° (CHCl₃, c=1.08, 28.0°C) mp. 141-143°C

No. 1a - 173

CDCl₃, 300MHz

1.15-2.42(17H, m), 2.91(1H, m), 3.15(1H, d, J=4.2Hz), 5.25-5.40(2H, m), 7.85(1H, t, J=7.2Hz), 8.00(1H, t, J=8.1Hz), 8.15-8.30(2H, m), 8.67(1H, d, J=8.1Hz), 8.73(1H, d, J=8.1Hz), 8.83(1H, s), 9.48(1H, s).
IR(KBr): 3422, 3269, 3046, 2952, 2871, 1711, 1617, 1447, 1333, 1243, 1161, 1146/cm.

[α]_D²⁰ = -41.0° (CH₃OH, c=1.01, 23°C).

No. 1a - 174

CDCl₃+d₆-DMSO 300MHz

1.00-1.92(14H, m), 2.20(2H, t, J=8.6Hz), 2.35(1H, m), 2.92(1H, m), 5.05-5.22(2H, m), 6.68(1H, d, J=5.4Hz), 7.77-7.92(2H, m), 8.31(1H, d, d, J=1.8 Hz, 8.7Hz), 8.59(1H, d, J=8.7Hz), 8.78(1H, d, J=8.7Hz), 9.01(1H, s), 9.55(1H, d, J=1.8Hz).
IR(KBr): 3433, 3252, 2952, 2871, 1696, 1578, 1429, 1335, 1308, 1219, 1185, 1160, 1106/cm.

[α]_D²⁰ = -19.3° (DMSO, c=0.50, 22°C).

No. 1a - 175

CDCl₃, 300MHz

0.96-1.87(14H, m), 2.20-2.25(2H, m), 2.95(1H, m), 3.66(2H, s), 4.74(1H, d, J=6.6Hz), 5.10-5.12(2H, m), 6.88(1H, d, J=1.2Hz), 7.37-7.50(2H, m), 7.56(1H, dd, J=2.7, 1.6Hz), 7.85-7.77(2H, m), 8.06(1H, s), 9.44(1H, dd, J=1.2Hz).
IR(CHCl₃): 3462, 3374, 3036, 3006, 2952, 2872, 1724, 1610, 1530, 1464, 1462, 1258, 1309, 1147.

[α]_D²⁰ = +16.4° (CHCl₃, c=1.05, 26°C) mp. 130-132°C.

No. 1a - 176

CDCl₃+CD₃OD 300MHz

1.00-2.02(14H, m), 2.22(1H, m), 2.29(2H, t, J=6.9Hz), 2.88(1H, m), 5.15-5.26(2H, m), 6.87(1H, s), 7.28-7.37(4H, m), 7.69(1H, d, J=6.4Hz), 7.75-7.78(2H, m), 7.99(1H, s).

IR(KBr): 3254, 2944, 1704, 1484, 1453, 1358, 1305, 1147.

[α]_D²⁰ = +13.0° (CH₃OH, c=1.02, 24°C) mp. 160-161°C

No. 1a - 177

CDCl₃, 300MHz

.96-1.89(14H, m), 1.89-2.26(2H, m), 2.94(1H, m), 3.67(2H, s), 3.87(2H, s), 4.67(1

H, brs), 5.08-5.14 (2H, m), 6.77 (1H, d, J=1.5 Hz), 6.99-7.03 (2H, m), 7.53-7.57 (1H, m), 7.65-7.70 (3H, m), 8.00 (1H, s), 9.27 (1H, brs).
IR(CHCl₃): 3426, 3276, 3006, 2952, 1724, 1610, 1495, 1458, 1357, 1308, 1282, 1249, 1177, 1147/cm.
[α]_D²⁰ = +18.1° (CHCl₃, c=1.02, 22°C).

No. 1a - 178

CDCl₃+CD₃OD 300MHz
.96-1.91 (14H, m), 2.19 (1H, m), 2.27 (2H, t, J=6.0 Hz), 2.85 (1H, m), 3.87 (3H, s), 5.1
6-5.23 (2H, m), 6.99-7.02 (2H, m), 7.41 (1H, m), 7.64-7.78 (3H, m), 7.92 (1H, m).
IR(CHCl₃): 3388, 3281, 3004, 2954, 2878, 1706, 1611, 1498, 1458, 1438, 1304, 1286,
1253, 1180, 1149, 1128/cm.
[α]_D²⁰ = +14.6° (CHCl₃, c=1.02, 22°C).

No. 1a - 179

CDCl₃+CD₃OD 300MHz
0.86-1.87 (14H, m), 2.15-2.23 (3H, m), 2.92 (1H, m), 3.85 (3H, s), 6.10-6.16 (2H, m), 6.
90-6.98 (2H, m), 7.50 (1H, m), 7.60-7.65 (3H, m), 7.91 (1H, d, J=0.9 Hz).
IR(CHCl₃): 3369, 3270, 2950, 2878, 1719, 1612, 1498, 1456, 1440, 1359, 1306, 1269,
1218, 1146, 1127/cm.
[α]_D²⁰ = +18.1° (CH₃OH, c=1.00, 22°C).

No. 1a - 180

CDCl₃+CD₃OD 300MHz
1.03-1.86 (14H, m), 2.05-2.17 (3H, m), 2.91 (1H, m), 5.06-5.10 (2H, m), 6.76 (1H, m),
6.86-6.90 (2H, m), 7.48 (1H, m), 7.81-7.69 (3H, m), 7.89 (1H, m).
IR(CHCl₃): 3360, 3269, 2954, 2878, 1708, 1612, 1497, 1457, 1360, 1306, 1272, 1230,
1176, 1148, 1126/cm.
[α]_D²⁰ = +20.3° (CH₃OH, c=1.00, 22°C).

No. 1a - 181

CDCl₃ 300MHz
0.97-1.96 (14H, m), 2.15 (1H, m), 2.29 (2H, t, J=6.9 Hz), 3.05 (1H, m), 3.81 (3H, s), 5.0
8 (1H, d, J=6.9 Hz), 5.23-5.25 (2H, m), 6.62 (1H, s), 7.47-7.54 (5H, m), 7.59 (1H, m), 7.
70 (1H, m), 7.97 (1H, m).
IR(CHCl₃): 3380, 3280, 3020, 2946, 2885, 1708, 1466, 1388, 1328, 1149/cm.
[α]_D²⁰ = +32.9° (CHCl₃, c=1.07, 22°C).

No. 1a - 182

CDCl₃ 300MHz
0.94-1.90 (14H, m), 2.25 (2H, t, J=7.5 Hz), 2.30 (1H, m), 2.98 (1H, m), 3.70 (3H, s), 4.8
8 (1H, d, J=6.8 Hz), 5.13-5.16 (2H, m), 6.95 (1H, d, J=1.6 Hz), 7.11-7.23 (2H, m), 7.43 (1H, d, J=8.1 Hz), 7.63 (1H, d, J=8.1 Hz), 7.79-7.93 (4H, m), 9.08 (1H, br).
IR(CHCl₃): 3458, 3372, 3020, 3002, 2946, 2868, 1719, 1598, 1452, 1422, 1321, 1300,
1157/cm.
[α]_D²⁰ = -6.8° (CHCl₃, c=1.00), mp 150-151°C

No. 1a - 183

CDCl₃ 300MHz
0.95-1.94 (14H, m), 2.26 (1H, m), 2.28 (2H, t, J=7.5 Hz), 3.00 (1H, m), 5.16-5.19 (2H, m),
5.32 (1H, d, J=7.2 Hz), 6.93 (1H, d, J=1.2 Hz), 7.13 (1H, m), 7.22 (1H, dd, J=7.8, 6.6 Hz), 7.42 (1H, d, J=7.8 Hz), 7.63 (1H, d, J=7.8 Hz), 7.76 (2H, d, J=8.4 Hz), 7.90 (2H, d, J=8.4 Hz), 8.95 (1H, br).
IR(CHCl₃): 3458, 3274, 3260, 3020, 3002, 2948, 2868, 1708, 1598, 1452, 1422, 130
1, 1156/cm.
[α]_D²⁰ = +17.9° (CHCl₃, c=1.01, 22°C).

No. 1a - 184

CDCl₃, 300MHz

0.92-2.00(14H,m), 2.20(1H,m), 2.84(2H,t,J=6.5Hz), 3.05(1H,m), 5.20-5.38(2H,m), 7.29-7.44(2H,m), 7.61-7.66(1H,m), 7.90-7.94(1H,m), 8.05(2H,d,J=8.5Hz), 8.40(2H,d,J=8.5Hz).

IR(CHCl₃): 2984, 2971, 3019, 2958, 1709, 1615, 1599, 1551, 1458, 1405, 1344, 1326, 1245, 1168/cm.

[α]_D²⁰ = +18.5° (CHCl₃, c=1.00, 21°C).

No.1a - 185

CDCl₃, 300MHz

0.89-2.20(16H,m), 2.26(2H,d,t,J=2.1 Hz 7.2Hz), 2.99(1H,m), 3.08(1H,d,J=6.5Hz), 5.09-5.24(2H,m), 5.90(1H,d,J=1.2Hz), 7.22-7.48(4H,m), 7.64-7.72(2H,m), 8.20(1H,d,J=1.2Hz), 9.00(1H,s).

IR(CHCl₃): 2984, 2975, 3275, 3022, 2956, 1707, 1605, 1490, 1449, 1356, 1322, 1219, 1147, 1131/cm.

[α]_D²⁰ = +21.6° (CHCl₃, c=1.01, 23°C).

No.1a - 186

CDCl₃, 300MHz

1.86-2.24(14H,m), 2.31(2H,t,J=7.4Hz), 2.49(1H,bro), 2.87(1H,m), 3.67(2H,s), 5.38-5.50(2H,m), 7.40-7.63(2H,m).

IR(CHCl₃): 2975, 1727, 1602, 1485, 1362, 1221, 1207, 1168, 1045/cm.

No.1a - 187

CDCl₃, 300MHz

1.10-2.25(14H,m), 2.36(2H,t,J=7.3Hz), 2.47(1H,m), 2.87(1H,m), 5.35-5.54(2H,m), 5.62(1H,d,J=7.2Hz), 7.39-7.70(2H,m).

IR(CHCl₃): 3674, 3496, 2978, 2924, 3012, 2952, 2880, 2850, 1725(sh), 1709, 1602, 1485, 1420, 1360, 1167/cm.

[α]_D²⁰ = +82° (CHCl₃, c=1.69).

No.1a - 188

CDCl₃, 300MHz

0.86-1.92(14H,m), 2.22(2H,m), 2.36(2H,s), 2.95(1H,m), 3.67(2H,s), 3.92(2H,s), 4.81(1H,d,J=8.2Hz), 5.04-5.20(2H,m), 7.02-7.05(2H,m), 7.31(1H,d,J=8.5Hz), 7.39(1H,d,J=7.8Hz), 7.79-7.89(2H,m).

IR(CHCl₃): 3385, 3286, 3029, 3019, 3016, 2954, 2977, 1718, 1617, 1598, 1567, 1507, 1311, 1269, 1152 /cm.

[α]_D²⁰ = -29.4° (CHCl₃, c=1.01, 25°C).

No.1a - 189

[α]_D²⁰ = -7.7° (CHCl₃, c=1.00, 24°C).

No.1a - 190

[α]_D²⁰ = -17.8° (CHCl₃, c=1.00, 24°C).

No.1a - 191

CDCl₃, 300MHz

0.95-2.20(14H,m), 2.30(1H,m), 2.36(2H,d,J=6.9Hz), 2.21(1H,m), 4.25(2H,s), 5.07(1H,d,J=7.8Hz), 5.36-5.48(2H,m), 7.25(1H,dd,J=1.5 Hz 8.1Hz), 7.32-7.55(2H,m), 7.59(1H,d,J=8.1Hz), 7.94(1H,s), 8.14(1H,d,J=2.7Hz), 8.23(1H,d,d,J=2.7 Hz 8.7Hz).

IR(CHCl₃): 2986, 3026, 3015, 2957, 2977, 2883, 1702, 1617, 1573, 1530, 1348, 1128 /cm.

[α]_D²⁰ = -6.1° (CHCl₃, c=1.01, 25°C).

No.1a - 192

CDCl₃, 300MHz

0.92-2.20(14H,m), 2.18(3H,m), 2.23(1H,m), 2.64(3H,s), 2.94(3H,s), 4.22(2H,s), 4.38(1H,d,J=7.8Hz), 5.27-5.42(2H,m), 7.16-7.42(6H,m), 7.53(1H,d,J=8.4Hz), 7.94(1H,s).

IR(CHCl₃): 3389, 3032, 3012, 2953, 2877, 1716, 1616, 1560, 1455, 1340, 1336, 1124 /cm.

[α]_D²⁰ = -18.2° (CHCl₃, c=1.01, 25°C).

No. 1a - 193

CDCl₃, 300MHz

0.92-2.20(14H,m), 2.25(1H,m), 2.35(2H,t,J=7.3Hz), 3.17(1H,m), 4.22(2H,s), 4.91(1H,d,J=7.5Hz), 5.27-5.42(2H,m), 7.18-7.43(6H,m), 7.60(1H,d,J=6.1Hz), 8.05(1H,s).

IR(CHCl₃): 3511, 3357, 3029, 3020, 3011, 2987, 2877, 2851, 1698, 1614, 1560, 1506, 1320, 1280, 1252, 1128 /cm.

[α]_D²⁰ = -0.9° (CHCl₃, c=1.00, 25°C).

No. 1b - 1

CDCl₃, 300MHz

0.98-1.56(15H,m), 1.85-1.90(5H,m), 2.23(1H,m), 3.05(1H,m), 3.86(3H,s), 4.77(1H,d,J=6.0Hz), 5.05-5.28(2H,m), 7.46(3H,m), 7.38-7.54(2H,d,J=7.5Hz), 7.72(2H,d,J=8.4Hz), 7.93(2H,d,J=8.4Hz).

IR(CHCl₃): 3384, 3028, 2952, 2876, 1719, 1595, 1391, 1322, 1155 /cm.

[α]_D²⁵ = +4.0→6.0 (CHCl₃, c=1.00, 25°C).

mp. 98-98°C

No. 1b - 2

CDCl₃, 300MHz

0.98-1.52(15H,m), 1.85-1.90(5H,m), 2.17(1H,m), 3.00(1H,m), 3.67(3H,s), 4.06(2H,s), 4.83(1H,d,J=6.0Hz), 5.05-5.28(2H,m), 7.14(2H,d,J=7.2Hz), 7.17-7.32(5H,m), 7.78(2H,d,J=8.4Hz).

IR(CHCl₃): 3384, 3028, 2952, 2874, 1719, 1595, 1458, 1407, 1320, 1180 /cm.

[α]_D²⁰ = +2.5° (CHCl₃, c=1.02, 24°C).

No. 1b - 3

CDCl₃, 300MHz

0.96-2.05(20H,m), 2.07(1H,m), 3.07(1H,m), 4.04(2H,s), 5.21-5.35(2H,m), 5.55(1H,d,J=6.9Hz), 7.14(2H,d,J=8.6Hz), 7.20-7.32(5H,m), 7.78(2H,d,J=8.1H).

IR(CHCl₃): 3350, 3022, 2950, 1699, 1596, 1495, 1453, 1405, 1318, 1153 /cm.

[α]_D²⁰ = +17.1° (CHCl₃, c=1.01, 25°C).

mp. 129-131°C.

No. 1b - 4

CDCl₃, 300MHz

0.90-2.10(15H,m), 1.19(3H,s), 1.20(3H,s), 3.11(1H,m), 5.24-5.32(2H,m), 5.70(1H,d,J=8.6Hz), 7.28-7.68(4H,m), 7.96-8.04(2H,m), 8.85(1H,d,J=1.4Hz).

IR(CHCl₃): 3384, 3246, 2958, 1701, 1622, 1595, 1468, 1445, 1322, 1218, 1202, 1190, 1155, 1122 /cm.

[α]_D²⁰ = +10.8° (CHCl₃, c=0.51, 23°C).

No. 1b - 5

1.02-2.10(15H,m), 1.18(3H,s), 3.02(1H,m), 4.09(2H,s), 5.23-5.28(2H,m), 5.78(1H,d,J=7.3Hz), 7.36-7.63(4H,m), 7.97(1H,d,J=7.5Hz), 8.18(1H,s).

IR(CHCl₃): 3369, 2959, 1702, 1685, 1585, 1468, 1454, 1441, 1415, 1318, 1222, 1189, 1170, 1154 /cm.

[α]_D²⁰ = +9.9° (CHCl₃, c=1.00, 25°C).

No. 1c - 1

CDCl₃, 300MHz

1.10-2.02(14H,m),2.27(2H,t,J=7.5Hz),2.50(1H,m),2.59(3H,s),2.51(1H,m),2.6
4(3H,s),5.16-5.30(2H,m),7.34-7.42(3H,m),7.50-7.59(2H,m),7.62-7.68(2H,m),
7.76-7.82(2H,m).

IR(CHCl₃):3020,2946,2868,2212,1727,1598,1495,1487,1329,1158,1135,1084
/cm.

[α]_D=-16.1° (CHCl₃,c=1.05,25.0°C).

m.p.100-102°C

No.1c-2

CDCl₃ 300MHz

1.10-2.05(14H,m),2.23(2H,t,J=7.5Hz),2.55(1H,m),2.91(3H,s),2.85(1H,m),2.6
2(3H,s),5.02-5.30(2H,m),7.50-7.60(3H,m),7.90-8.05(6H,m).

IR(CHCl₃):3016,2946,2868,1728,1487,1398,1340,1160,1086 /cm.

[α]_D=-22.5° (CHCl₃,c=1.00,25.0°C).

No.1c-3

CD₃OD 300MHz

1.15-2.05(14H,m),2.13(2H,t,J=7.2Hz),2.47(1H,m),2.91(3H,s),2.27(1H,m),4.9
0-5.30(2H,m),7.27-7.44(3H,m),7.53-7.61(2H,m),7.71-7.77(2H,m),7.81-7.87(2
H,m).

IR(KBr):3412,2999,2951,2871,2217,1660,1399,1243,1159,1137,1103,1084.

[α]_D=-5.6° (CH₃OH,c=1.03,25°C).

No.1d-1

CDCl₃ 300MHz

1.00-2.16(15H,m),2.36(2H,t,J=7.2Hz),3.17(1H,m),3.33(3H,s),5.23-5.43(3H,m
)7.51-7.59(3H,m),7.91-8.10(6H,m),9.02(1H,br).

IR(CHCl₃):3282,3268,3028,2954,2874,1715,1442,1400,1287,1162,1120,1089/
cm.

[α]_D=+40.0° (CHCl₃,c=0.53,22°C).

No.1d-2

CDCl₃ 300MHz

1.03-2.30(17H,m),3.03(1H,m),4.03(2H,s),5.26(2H,m),5.84(1H,br),5.25-5.29(1
H,d,J=6.6Hz),6.03(1H,br),7.14(2H,d,J=8.1Hz),7.26-7.31(5H,m),7.80(2H,d,J=8.1Hz).

IR(CHCl₃):3276,3002,2946,1669,1595,1492,1454,1406,1318,1154/cm.

[α]_D=+4.3° (CHCl₃,c=1.00,23°C).

No.1d-3

CDCl₃ 300MHz

0.96-2.17(17H,m),2.33(2H,t,J=6.9Hz),3.01(1H,m),4.04(2H,s),5.10(1H,d,J=6.
6Hz),5.21-5.26(2H,m),7.14(2H,d,J=8.7Hz),7.16-7.32(5H,m),7.75(2H,d,J=8.4
Hz).

IR(CHCl₃):3280,3020,2946,1711,1596,1492,1457,1407,1318,1154/cm.

[α]_D=+9.5° (CHCl₃,c=1.08,25°C).

No.1d-4

CDCl₃ 300MHz

0.95-2.14(15H,m),2.34(2H,t,J=7.2Hz),3.09(1H,m),3.30(3H,s),4.04(2H,s),5.19
(1H,d,J=7.2Hz),5.22-5.39(2H,m),7.10-7.35(7H,m),7.51(2H,d,J=8.1Hz),9.10(1
H,br).

IR(CHCl₃):3282,3260,3028,2952,2874,2670,1718,1595,1492,1450,1406,1388,
1160,1120,1092/cm.

[α]_D=+22.2° (CHCl₃,c=1.07,22°C).

No.1d-5

CDCl₃ 300MHz

1.00-2.10(14H,m), 2.30-2.39(3H,m), 2.15(1H,m), 2.35(3H,s), 5.15-5.40(2H,m), 7.41(1H,d,t,J=0.9 Hz, 7.8Hz), 7.50-7.69(3H,m), 7.83-8.16(2H,m), 8.60(1H,d,J=1.5Hz), 9.06(1H,s).
IR(CHCl₃): 3382, 3268, 3028, 2954, 2874, 1714, 1448, 1402, 1338, 1185, 1155, 121, 1072/cm.
[α]_D²⁰ = +15.2° (CHCl₃, c=1.00, 23°C).

No. 1e-1

CDCl₃, 300MHz
1.19-2.45(19H,m), 2.55(1H,m), 5.63(1H,d,J=8.0Hz), 7.42-7.65(4H,m), 7.94-8.03(2H,m), 8.49-8.60(1H,m).
IR(CHCl₃): 3293, 3024, 1710, 1595, 1564, 1467, 1445, 1410, 1324, 1222, 1213, 1206, 1190, 1160/cm.
[α]_D²⁰ = -41.1° (CHCl₃, c=1.01, 23°C).

No. 1e-2

CDCl₃, 300MHz
1.10-2.25(19H,m), 2.94(1H,m), 4.12(3H,s), 5.53(1H,d,J=7.2Hz), 7.59(1H,m), 7.60-7.62(3H,m), 7.96(1H,d,J=7.5Hz), 8.12(1H,s).
IR(CHCl₃): 3387, 3025, 2955, 1711, 1634, 1600, 1584, 1468, 1454, 1440, 1415, 1342, 1317, 1222, 1189, 1157/cm.
[α]_D²⁰ = +1.2° (CHCl₃, c=1.00, 25°C).

No. 1f-1

CDCl₃, 300MHz
1.08-2.47(19H,m), 2.56(1H,m), 3.52(2H,t,J=6.8Hz), 5.59(1H,d,J=2.4Hz), 7.40-7.66(4H,m), 7.95-8.04(2H,m), 8.50(1H,d,J=1.8Hz).
IR(CHCl₃): 3324, 3353, 3295, 2950, 2877, 1705, 1595, 1584, 1468, 1445, 1405, 1347, 1337, 1324, 1224, 1190, 1160/cm.
[α]_D²⁰ = -54.1° (CHCl₃, c=1.01, 23°C).

No. 1f-2

CDCl₃, 300MHz
1.05-2.34(19H,m), 2.94(1H,m), 3.53(2H,t,J=6.8Hz), 4.13(3H,s), 5.47(1H,d,J=6.6Hz), 7.36-7.62(4H,m), 7.96(1H,d,J=6.8Hz), 8.14(1H,s).
IR(CHCl₃): 3325, 3355, 3025, 3018, 2949, 2877, 1710, 1694, 1600, 1584, 1468, 1454, 1440, 1415, 1342, 1317, 1332, 1220, 1189, 1157/cm.
[α]_D²⁰ = -5.6° (CHCl₃, c=1.00, 25°C).

No. 1g-1

CDCl₃, 200MHz
1.17-2.34(15H,m), 3.22(1H,m), 5.10-5.16(2H,m), 5.45(1H,d,J=7.0Hz), 7.35-7.66(4H,m), 7.95-8.01(2H,m), 8.51(1H,d,J=2.0Hz).
IR(CHCl₃): 3383, 3275, 2959, 1707, 1595, 1584, 1468, 1445, 1425, 1319, 1269, 1248, 1190, 1149, 1128/cm.
[α]_D²⁰ = +64.3° (CHCl₃, c=1.01, 23°C).

No. 1g-2

CDCl₃, 300MHz
1.10-2.15(15H,m), 2.56(2H,t,J=7.2Hz), 3.21(1H,m), 4.09(3H,s), 5.10-5.22(2H,m), 5.43(1H,d,J=7.8Hz), 7.36-7.62(4H,m), 7.96(1H,d,J=7.8Hz), 8.12(1H,s).
IR(CHCl₃): 3366, 2959, 1705, 1635, 1600, 1585, 1467, 1454, 1440, 1415, 1345, 1318, 1238, 1189, 1152/cm.
[α]_D²⁰ = +108.1° (CHCl₃, c=1.01, 23°C).

No. 1h-1

CDCl₃, 300MHz
0.90-1.60(17H,m), 1.83(1H,m), 2.11(1H,m), 2.22(2H,t,J=7.2Hz), 5.07(1H,m), 5.

11(1H, d, J=7.2Hz), 7.55-7.47(1H, m), 7.50-7.40(1H, m), 7.30-7.22(2H, m), 7.22-8.
12(2H, m), 8.54(1H, d, J=0.9Hz).
IR(CHCl₃): 3383, 3274, 2928, 1707, 1484, 1442, 1318, 1268, 1188, 1152, 1121, 1105,
1071, 1019/cm.
[α]_D²⁰ = -2.6° (CHCl₃, c=1.01, 23°C).

No. 1i- 1
[α]_D²⁰ = +50.9° (CHCl₃, c=1.01, 24°C).

No. 1i- 2
CDCl₃, 300MHz
0.98-1.70(11H, m), 1.80-2.00(5H, m), 2.19(1H, m), 3.08(1H, m), 3.64(2H, t, J=8.6Hz),
4.08(2H, s), 4.89(1H, d, J=8.6Hz), 5.15(1H, m), 5.25(1H, m), 7.16(2H, d, J=7.2Hz),
7.27-7.32(5H, m), 7.77(2H, d, J=8.4Hz).
IR(CHCl₃): 3378, 3004, 2946, 2816, 1696, 1492, 1453, 1407, 1318, 1154/cm.
[α]_D²⁰ = +3.5° (CHCl₃, c=1.00, 22°C).
mp. 80.5-82.0°C

No. 1j- 1
[α]_D²⁰ = -7.5 ± 0.5° (CHCl₃, c=1.05, 22°C).

No. 1j- 2
[α]_D²⁰ = -9.7 ± 0.5° (CHCl₃, c=1.06, 22°C).

No. 1j- 3
[α]_D²⁰ = +15.0 ± 0.5° (CH₃OH, c=1.06, 24.5°C).
mp. 101-103°C

No. 1j- 4
[α]_D²⁰ = -28.0 ± 0.6° (CHCl₃, c=1.06, 24°C).
mp. 189-191°C

1j- 5
[α]_D²⁰ = -12.5 ± 0.5° (CHCl₃, c=1.04, 23°C).
mp. 99-101°C

No. 1j- 6
CDCl₃, 300MHz
0.90-2.03(14H, m), 2.20(1H, m), 2.30(2H, t, J=7.2Hz), 3.00(1H, m), 3.68(2H, s), 4.76
(1H, d, J=6.8Hz), 5.13-5.38(2H, m), 7.01-7.08(4H, m), 7.19-7.26(1H, m), 7.37-7.48
(2H, m), 7.80-7.84(2H, m).
IR(CHCl₃): 3382, 3280, 3080, 3016, 2952, 2900, 1727, 1582, 1486, 1482, 1322, 1150/
cm.
[α]_D²⁰ = -31.0° (CHCl₃, c=1.05, 26°C).

No. 1j- 7
CDCl₃, 300MHz
0.91-2.09(14H, m), 2.15(1H, m), 2.35(2H, t, J=7.5Hz), 3.01(1H, m), 5.17(1H, d, J=8.
6Hz), 5.31-5.54(2H, m), 7.01-7.08(4H, m), 7.15-7.27(1H, m), 7.37-7.48(2H, m), 7.8
0-7.85(2H, m).
IR(CHCl₃): 3474, 3386, 3270, 3024, 2958, 2900, 2875, 1711, 1584, 1488, 1420, 1323,
1298, 1150/cm.
[α]_D²⁰ = -13.4° (CHCl₃, c=1.01, 26°C).

No. 1j- 8
CDCl₃, 300MHz
0.95-2.14(13H, m), 2.30(2H, t, J=7.5Hz), 2.36(1H, m), 2.84(1H, m), 2.91(1H, t, J=4.8Hz),
3.66(2H, s), 5.33-5.53(2H, m), 6.82-6.87(1H, m), 6.93-7.00(2H, m), 7.09-7.15(4H,

m), 7.28-7.26(2H, m), 7.54-7.59(1H, m).
IR(CHCl₃): 3350, 3010, 2950, 2880, 1722, 1608, 1582, 1489, 1481, 1438, 1380, 1160
/cm.
[α]_D²⁰ = +75.1° (CHCl₃, c=1.18, 25°C).

No. 1j-9

CDCl₃, 300MHz
0.95-2.08(14H, m), 2.20(1H, m), 2.39(2H, t, J=7.5Hz), 3.06(1H, m), 3.68(3H, s), 4.9
8(1H, d, J=7.4Hz), 5.14-5.34(2H, m), 7.46-7.64(2H, m), 7.60-7.68(1H, m), 7.73-7.8
0(2H, m), 7.88-7.92(2H, m), 7.99-8.03(2H, m).
IR(CHCl₃): 3384, 3280, 3020, 2960, 2858, 1727, 1662, 1600, 1516, 1278, 1162/cm.
[α]_D²⁰ = -41.0° (CHCl₃, c=1.17, 25°C).

No. 1j-10

CDCl₃+CD₃OD 300MHz
0.94-2.08(14H, m), 2.21(1H, m), 2.34(2H, t, J=6.2Hz), 3.04(1H, m), 5.21-5.35(2H,
m), 5.40(1H, m), 7.48-7.58(2H, m), 7.64-7.68(1H, m), 7.79-8.06(3H, m).
IR(CHCl₃): 3475, 3370, 3250, 3018, 2956, 2976, 2850, 1709, 1662, 1595, 1445, 1420,
1395, 1317, 1274, 1162/cm.
[α]_D²⁰ = -17.1° (CHCl₃, c=1.13, 25°C).

No. 1j-11

CDCl₃, 300MHz
1.06-1.98(14H, m), 2.24-2.29(3H, m), 3.18(1H, m), 3.66(3H, s), 5.10-5.34(2H, m), 5.
40(1H, d, J=6.3Hz), 7.39-7.49(3H, m), 7.59-7.64(3H, m), 7.80-7.83(2H, m), 8.06-8.
11(1H, m).
IR(CHCl₃): 3302, 3012, 2948, 2905, 1727, 1661, 1592, 1485, 1382, 1312, 1287, 1271,
1165/cm.
[α]_D²⁰ = +15.6° (CHCl₃, c=1.03, 25°C).

No. 1j-12

CDCl₃, 300MHz
1.08-1.98(14H, m), 2.23(1H, m), 2.33(2H, t, J=7.5Hz), 3.16(1H, m), 5.18-5.26(2H,
m), 5.39-5.45(1H, m), 7.39-7.49(3H, m), 7.60-7.64(3H, m), 7.80-7.83(2H, m), 8.09-
8.12(1H, m).
IR(CHCl₃): 3325, 3022, 2956, 2872, 2850, 1708, 1662, 1608, 1598, 1425, 1340, 1316,
1288, 1271, 1165/cm.
[α]_D²⁰ = +9.7° (CHCl₃, c=0.52, 25°C).

No. 1j-13

CDCl₃, 300MHz
0.95-2.00(14H, m), 2.20(1H, m), 2.27(2H, t, J=6.8Hz), 3.03(1H, m), 3.67(3H, s), 4.9
9(1H, d, J=6.6Hz), 5.13-5.31(2H, m), 7.47-7.55(2H, m), 7.60-7.69(2H, m), 7.76-7.8
1(2H, m), 7.96-8.05(1H, m), 8.08-8.14(1H, m), 8.27-8.28(1H, m).
IR(CHCl₃): 3374, 3338, 3376, 3276, 3012, 2948, 2850, 1726, 1662, 1596, 1440, 1385,
1317, 1297, 1274, 1166, 1160/cm.
[α]_D²⁰ = +10.3° (CHCl₃, c=1.00, 25°C).

No. 1j-14

CDCl₃, 300MHz
0.93-2.08(14H, m), 2.21(1H, m), 2.32(2H, t, J=6.3Hz), 3.00(1H, m), 5.20-5.26(2H,
m), 5.38(1H, d, J=6.3Hz), 7.50-7.55(2H, m), 7.83-7.71(3H, m), 7.77-7.81(2H, m), 7.
99-8.04(1H, m), 8.10-8.18(1H, m), 8.32-8.38(1H, m).
IR(CHCl₃): 3674, 3480, 3374, 3258, 3012, 2950, 2876, 2850, 1709, 1662, 1592, 1418,
1385, 1317, 1274, 1142/cm.
[α]_D²⁰ = +61.0° (CHCl₃, c=1.19, 25°C).

No. 1j-15

CDCl₃, 800MHz

0.90-2.00(14H,m), 2.19(1H,m), 2.80(2H,t,J=7.5Hz), 3.01(1H,m), 3.67(3H,s), 4.8
2(1H,d,J=8.5Hz), 5.14-5.34(2H,m), 7.86-7.89(2H,m), 7.88-7.97(2H,m), 7.62-7.8
6(2H,m), 7.88-7.89(2H,m).

IR(CHCl₃): 3376, 3276, 3010, 2948, 2868, 2212, 1727, 1597, 1500, 1437, 1325, 1161/
cm.

[α]_D²⁰ = -7.2° (CHCl₃, c=1.00, 26°C).

No.1j-16

CDCl₃, 800MHz

0.98-2.09(14H,m), 2.15(1H,m), 2.36(2H,t,J=7.5Hz), 3.05(1H,m), 5.20-5.40(3H,
m), 7.86-7.89(2H,m), 7.85-7.88(4H,m), 7.84-7.88(2H,m).

IR(CHCl₃): 3470, 3376, 3260, 3012, 2960, 2868, 2675, 2212, 1708, 1596, 1503, 1416,
1396, 1322, 1160.

[α]_D²⁰ = -22.4° (CHCl₃, c=1.00, 26°C).

No.1j-17

CDCl₃, 800MHz

1.00-1.60(9H,m), 1.79-1.89(5H,m), 2.17(1H,brs), 2.23(2H,t,J=7.2Hz), 3.03(1H,
m), 5.10-5.23(2H,m), 5.49(1H,d,J=8.6Hz), 7.40(1H,t,J=7.4Hz), 7.53(1H,t,J=7.2
Hz), 7.60-7.68(2H,m), 7.95-8.03(2H,m), 8.55(1H,d,J=1.5Hz).

IR(CHCl₃): 3516, 3354, 3270, 2666, 1708, 1632, 1595, 1534, 1467, 1445, 1425, 1374,
1245, 1221, 1209, 1245, 1215/cm.

[α]_D²⁰ = -7.8° (CHCl₃, c=1.01, 22°C).

No.1j-18

CDCl₃, 800MHz

0.90-2.03(14H,m), 2.19(1H,m), 2.80(2H,t,J=7.5Hz), 3.00(1H,m), 3.67(3H,s), 4.8
0(1H,d,J=8.4Hz), 5.14-5.35(2H,m), 6.99-7.04(2H,m), 7.16-7.22(3H,m), 7.34-7.4

9(4H,m), 7.57-7.61(1H,m).

IR(CHCl₃): 3376, 3276, 3012, 2948, 2875, 1727, 1682, 1482, 1471, 1432, 1330, 1311,
1160/cm.

[α]_D²⁰ = +54.0° (CHCl₃, c=0.99, 25°C).

No.1j-19

CDCl₃, 800MHz

0.91-2.09(14H,m), 2.15(1H,m), 2.94(2H,t,J=7.5Hz), 3.01(1H,m), 5.16(1H,d,J=8.
6Hz), 5.24-5.40(2H,m), 7.01-7.08(2H,m), 7.15-7.25(2H,m), 7.25-7.63(4H,m), 7.5
9-7.65(1H,m).

IR(CHCl₃): 3470, 3376, 3260, 3012, 2960, 2875, 2640, 1708, 1683, 1468, 1471, 1430,
1325, 1305, 1149/cm.

[α]_D²⁰ = -21.0° (CHCl₃, c=1.30, 26°C).

No.1j-20

CDCl₃, 800MHz

1.17(1H,m), 1.26-1.34(2H,m), 1.54-2.24(11H,m), 2.31(2H,t,J=7.4Hz), 2.48(1H,
brs), 3.37(1H,m), 3.67(3H,s), 5.35-5.60(2H,m), 7.89-7.63(9H,m).

IR(CHCl₃): 3377, 1727, 1601, 1435, 1362, 1168/cm.

No.1j-21

CDCl₃, 800MHz

1.10-2.25(14H,m), 2.66(2H,t,J=7.2Hz), 2.47(1H,m), 2.89(1H,m), 5.85-5.53(2H,
m), 5.63(1H,d,J=7.2Hz), 7.40-7.71(9H,m).

IR(CHCl₃): 3674, 3496, 3374, 3234, 3010, 2952, 2870, 2640, 1730(sh), 1710, 1605, 1
485, 1426, 1360, 1167/cm.

[α]_D²⁰ = -48.0° (CHCl₃, c=1.01, 25°C).

No.1j-22

CDCl₃, 800MHz
0.98-1.96(14H,m), 2.25-2.31(3H,m), 2.95(1H,m), 5.19-5.30(2H,m), 5.89(1H,d,J=8.9Hz), 6.59(1H,d,J=7.5Hz), 6.80(1H,t,J=7.5Hz), 6.99-7.05(1H,m), 7.44-7.53(6H,m), 7.60-7.73(3H,m), 7.94-7.75(5H,m), 8.23-8.26(2H,m), 10.65(1H,s).
IR(CHCl₃): 3475, 3372, 3260, 3008, 2953, 2868, 2722, 1735, 1710(ab), 1662, 1590, 1571, 1525, 1448, 1437, 1345, 1314, 1181, 1112/cm.
[α]_D²⁰ = +12.9° (CH₂Cl₂, c=0.12, 25°C).

No.1j- 2 3
CDCl₃, 800MHz
0.94-1.94(14H,m), 2.23-2.30(3H,m), 2.98(1H,m), 3.63(2H,s), 5.09(1H,d,J=6.2Hz), 5.15-5.23(2H,m), 7.14-7.22(1H,m), 7.34-7.42(2H,m), 7.55-7.73(2H,m), 7.99-8.03(4H,m), 8.51(1H,s).
IR(CHCl₃): 3372, 3275, 1724, 1673, 1699, 1428, 1320, 1161/cm.
[α]_D²⁰ = +17.0° (CHCl₃, c=1.38, 25°C).

No.1j- 2 4
CDCl₃+CD₃OD 800MHz
0.96-2.05(14H,m), 2.25-2.34(3H,m), 2.92(1H,m), 5.16-5.34(2H,m), 7.14-7.22(1H,m), 7.29-7.42(2H,m), 7.70(2H,d,J=7.6Hz), 7.92-8.05(4H,m).
IR(CHCl₃): 3616, 3426, 3375, 3010, 2950, 2828, 2845, 1708, 1672, 1699, 1439, 1323, 1161/cm.
[α]_D²⁰ = +21.0° (CH₃OH, c=1.00, 22°C).

No.1j- 2 5
CDCl₃, 800MHz
1.03(1H,m), 1.18-2.01(18H,m), 2.20(1H,brs), 2.27(2H,t,J=7.4Hz), 3.06(1H,m), 3.66(2H,s), 5.11(1H,d,J=6.6Hz), 5.14-5.34(2H,m), 7.54-7.62(3H,m), 8.04-8.32(6H,m).
IR(CHCl₃): 3384, 3278, 1726, 1605, 1464, 1448, 1331, 1161/cm.

No.1j- 2 6
CDCl₃+CD₃OD 800MHz
1.03-2.10(14H,m), 2.22(1H,m), 2.31(2H,t,J=7.5Hz), 2.98(1H,m), 5.28-5.35(2H,m), 7.55-7.66(2H,m), 8.05-8.08(2H,m), 8.14-8.16(2H,m), 8.29-8.31(2H,m).
IR(ν_{max}): 3260, 2720, 2660, 1711, 1545, 1460, 1317, 1163/cm.
[α]_D²⁰ = +15.8° (CH₃OH, c=1.01, 22°C).

No.1j- 2 7
[α]_D²⁰ = +16.7° (CHCl₃, c=1.00, 23°C).

No.1j- 2 8
CDCl₃, 800MHz
1.01(1H,m), 1.14-1.29(2H,m), 1.46-2.19(11H,m), 2.33(2H,t,J=7.2Hz), 2.41(1H,brs), 3.18-3.31(6H,m), 3.66(3H,s), 3.73-3.76(4H,m), 4.37(1H,d,J=7.2Hz), 5.35-5.45(2H,m).
IR(CHCl₃): 3592, 1727, 1435, 1335, 1148/cm.
[α]_D²⁰ = +10.7° (CHCl₃, c=1.39, 26°C).

No.1j- 2 9
CDCl₃, 800MHz
1.00(1H,m), 1.20-1.29(2H,m), 1.46-2.25(12H,m), 2.37(2H,t,J=7.2Hz), 3.17-3.22(5H,m), 3.74-3.79(4H,m), 4.79(1H,d,J=7.8Hz), 5.34-5.54(2H,m).
IR(CHCl₃): 3470, 3390, 3270, 3075, 1709, 1465, 1420, 1315, 1147/cm.
[α]_D²⁰ = +16.8° (CHCl₃, c=1.42, 26°C).

No.1k- 1
[α]_D²⁰ = -35.4° (CHCl₃, c=1.06, 23°C).

No.1k-2

CDCl₃, 300MHz

1.07-2.28(14H,m), 2.82(2H,t,J=7.4Hz), 2.62(1H,m), 3.68(3H,s), 3.98(1H,m), 5.8
0-5.52(2H,m), 6.88(1H,d,J=7.0Hz), 7.48-7.60(2H,m), 7.88-8.02(8H,m).

IR(CHCl₃): 3438, 3002, 2946, 2868, 1737, 1652, 1514, 1485, 1388, 1310, 1245, 1154
/cm.

[α]_D²⁰ = -80.4° (CHCl₃, c=1.01, 24.0°C).

No.1k-3

CDCl₃, 300MHz

1.10-2.26(14H,m), 2.37(2H,t,J=7.2Hz), 2.60(1H,m), 3.93(1H,m), 5.90-5.50(2H,
m), 6.88(1H,d,J=7.5Hz), 7.46-7.58(3H,m), 7.88-7.99(8H,m).

IR(CHCl₃): 3448, 3004, 2952, 2874, 1709, 1652, 1515, 1485, 1305, 1158 /cm.

[α]_D²⁰ = -96.4° (CHCl₃, c=1.05, 23.0°C).

No.1k-4

CDCl₃, 300MHz

1.05-2.17(14H,m), 2.88(2H,t,J=7.2Hz), 2.52(1H,m), 3.81(1H,m), 5.83-5.50(2H,
m), 6.08(1H,d,J=7.6Hz), 7.39-7.53(3H,m), 7.57-7.69(8H,m).

IR(CHCl₃): 3420, 3250, 3008, 2948, 2870, 2660, 2208, 1735(ab), 1705, 1640, 1500/
cm.

[α]_D²⁰ = -21.9 ± 0.6° (CHCl₃, c=1.02, 22°C).

No.1k-5

CDCl₃, 300MHz

1.05-2.14(14H,m), 2.38(2H,t,J=7.2Hz), 2.51(1H,m), 3.81(1H,m), 5.84-5.46(2H,
m), 6.07(1H,d,J=7.6Hz), 7.38-7.56(8H,m).

IR(CHCl₃): 3422, 3250, 3010, 2950, 2876, 2664, 2558, 2210, 1735(ab), 1705, 1645, 1

502, 1441, 1410, 1307, 1278/cm.

[α]_D²⁰ = -63.6 ± 1.9° (CHCl₃, c=0.56, 22°C).

No.1k-6

CDCl₃, 300MHz

1.04-2.24(14H,m), 2.88(2H,t,J=7.5Hz), 2.58(1H,m), 3.88(1H,m), 5.80-5.48(2H,
m), 6.21(1H,d,J=7.2Hz), 7.41-7.49(3H,m), 7.78-7.77(2H,m).

IR(CHCl₃): 3447, 3011, 2955, 1706, 1658, 1608, 1578, 1515, 1488, 1457, 1312, 1211,
1164/cm.

[α]_D²⁰ = -80.3° (CHCl₃, c=1.00, 23°C).

No.1k-7

CDCl₃, 300MHz

1.04-2.22(14H,m), 2.36(2H,t,J=7.2Hz), 2.57(1H,m), 3.87(1H,m), 5.80-5.44(3H,
m), 6.17(1H,d,J=8.7Hz), 6.99-7.40(7H,m), 7.78(2H,d,J=7.5Hz).

IR(CHCl₃): 3449, 3013, 2955, 1759, 1708, 1651, 1609, 1588, 1522, 1487, 1248, 1227,
1169/cm.

[α]_D²⁰ = -60.2° (CHCl₃, c=0.92, 23°C).

No.1k-8

CDCl₃, 300MHz

1.04-2.35(14H,m), 2.34(2H,t,J=7.5Hz), 2.56(1H,m), 3.87(1H,m), 5.80-5.44(3H,
m), 6.19(1H,d,J=7.5Hz), 6.83-6.94(8H,m), 7.69(2H,d,J=8.7Hz).

IR(CHCl₃): 3599, 3455, 3012, 2955, 1711, 1644, 1604, 1577, 1594, 1507, 1492, 1290,
1286, 1197, 1170/cm.

[α]_D²⁰ = -47.7° (CHCl₃, c=1.01, 23°C).

No.1k-9

CDCl₃, 300MHz

1.04-2.20(14H,m),2.31(3H,s),2.36(2H,t,J=7.2Hz),2.56(1H,m),2.56(1H,m),5.8
0-5.48(2H,m),6.18(1H,d,J=7.2Hz),7.00-7.11(3H,m),7.74(2H,d,J=8.7Hz).
IR(CHCl₃):8450,8010,2955,1750,1709,1681,1605,1596,1523,1489,1370,1247,
1227,1189/cm.
[α]_D=-54.7° (CHCl₃,c=1.01,22°C).

No.1k-10

CDCl₃, 300MHz

1.04-2.22(14H,m),2.35(2H,t,J=7.2Hz),2.56(1H,m),2.56(3H,s),2.56(1H,m),5.8
0-5.48(2H,m),6.17(1H,d,J=6.9Hz),6.89-7.01(3H,m),7.70(2H,d,J=8.7Hz).
IR(CHCl₃):3023,2955,1742,1708,1649,1618,1602,1577,1522,1507,1490,1227,
1210,1170/cm.
[α]_D=-58.1° (CHCl₃,c=1.01,22°C).

No.1m-1

CDCl₃, 300MHz

1.06-2.25(14H,m),2.32(2H,t,J=7.4Hz),2.61(1H,m),2.63(3H,s),2.91(1H,m),5.8
5-5.47(2H,m),6.24(1H,d,J=6.9Hz),7.35-7.38(3H,m),7.53-7.60(4H,m),7.75-7.7
8(2H,m).
IR(CHCl₃):3438,3008,2946,2875,2212,1732,1650,1606,1519,1498/cm.
[α]_D= +76° (CHCl₃,c=1.39,24°C)

No.1m-2

CDCl₃, 300MHz

1.05-2.20(14H,m),2.36(2H,t,J=6.2Hz),2.59(1H,m),2.59(1H,m),5.29-5.48(2H,
m),6.26(1H,d,J=7.0Hz),7.28-7.38(3H,m),7.52-7.60(4H,m),7.73-7.77(2H,m).
IR(CHCl₃):3444,3012,2952,2874,2664,2214,1718(sh),1708,1649,1606,1520,1
498/cm.
[α]_D= +81.4° (CHCl₃,c=1.01,22°C)

No.1m-3

CDCl₃, 300MHz

1.06-2.23(14H,m),2.32(2H,t,J=7.0Hz),2.62(1H,m),2.63(2H,s),2.93(1H,m),5.8
0-5.50(2H,m),6.26(1H,d,J=7.0Hz),7.38-7.51(3H,m),7.53-7.67(4H,m),7.82-7.8
3(2H,m).
IR(CHCl₃):3438,3008,2948,2875,1763(w),1727,1650,1608,1560(w),1523,150
1,1482/cm.
[α]_D= +59° (CHCl₃,c=1.49,25°C)

No.1m-4

CDCl₃, 300MHz

1.08-2.25(14H,m),2.36(2H,t,J=7.4Hz),2.59(1H,m),2.91(1H,m),5.28-5.48(3H,
m),6.29(1H,d,J=7.4Hz),7.38-7.50(3H,m),7.81-7.87(4H,m),7.81-7.86(2H,m).
IR(CHCl₃):3436,3010,2948,2868,1727,1715(sh),1649,1616(w),1524,1502,14
82,1372/cm.
[α]_D= +72° (CHCl₃,c=0.96,25°C)

No.1m-5

CDCl₃, 300MHz

1.09-2.20(14H,m),2.32(2H,t,J=7.2Hz),2.63(1H,m),2.63(2H,s),2.92(1H,m),5.8
1-5.51(2H,m),6.35(1H,d,J=7.0Hz),7.51-7.60(3H,m),7.92-7.97(3H,m).
IR(CHCl₃):3436,3008,2946,2875,1727,1652,1608(w),1515,1484/cm.
[α]_D= +82° (CHCl₃,c=0.99,25°C)

No.1m-6

CDCl₃, 300MHz

1.09-2.23(14H,m),2.37(2H,t,J=7.2Hz),2.60(1H,m),2.92(1H,m),5.20-5.49(2H,
m),6.32(1H,d,J=7.4Hz),7.51-7.55(3H,m),7.55-7.98(3H,m).

IR(CHCl₃): 3436, 3010, 2950, 2875, 2870, 1727, 1715(sh), 1650, 1605(w), 1515, 1484/cm.

[α]_D²⁰ = +84° (CHCl₃, c=1.84, 25°C)

No. 1m-7

CDCl₃, 300MHz

1.03-2.16(14H, m), 2.32(2H, t, J=7.4Hz), 2.59(1H, m), 3.64(3H, s), 3.89(1H, m), 5.29-5.49(2H, m), 6.16(1H, d, J=7.5Hz), 6.98-7.08(4H, m), 7.14-7.20(1H, m), 7.34-7.41(2H, m), 7.72-7.78(2H, m).

IR(CHCl₃): 3435, 3008, 2946, 2868, 1727, 1648, 1610, 1586, 1519, 1485/cm.

[α]_D²⁰ = +84° (CHCl₃, c=1.29, 25°C).

No. 1m-8

CDCl₃, 300MHz

1.06-2.21(14H, m), 2.36(2H, t, J=7.5Hz), 2.58(1H, m), 3.58(1H, m), 5.31-5.46(2H, m), 6.17(1H, d, J=8.9Hz), 6.99-7.08(4H, m), 7.15-7.21(1H, m), 7.35-7.41(2H, m), 7.72-7.75(2H, m).

IR(CHCl₃): 3436, 3010, 2948, 2868, 2675, 1730(sh), 1709, 1647, 1608, 1586, 1520, 1485/cm.

[α]_D²⁰ = +86° (CHCl₃, c=0.97, 25°C)

No. 1m-9

CDCl₃, 300MHz

1.05-2.18(14H, m), 2.29-2.34(5H, m), 2.59(1H, m), 3.64(3H, s), 3.89(1H, m), 5.32-5.46(2H, m), 6.16(1H, d, J=7.5Hz), 7.00-7.11(6H, m), 7.74-7.77(2H, m).

IR(CHCl₃): 3440, 3010, 2946, 2868, 1729, 1649, 1595, 1519, 1485/cm.

[α]_D²⁰ = +47° (CHCl₃, c=0.82, 25°C).

No. 1m-10

CDCl₃, 300MHz

1.04-2.20(14H, m), 2.31-2.39(5H, m), 2.57(1H, m), 3.27(1H, m), 5.28-5.47(2H, m), 6.17(1H, d, J=7.0Hz), 6.99-7.12(6H, m), 7.72-7.78(2H, m).

IR(CHCl₃): 3374, 3572, 3435, 3010, 2948, 2868, 2626, 1748, 1710, 1648, 1615, 1595, 1520, 1489/cm.

[α]_D²⁰ = +51° (CHCl₃, c=0.91, 25°C)

No. 1m-11

CDCl₃, 300MHz

1.04-2.16(14H, m), 2.31(2H, t, J=7.2Hz), 2.59(1H, m), 3.63(3H, s), 3.89(1H, m), 5.29-5.49(2H, m), 6.24(1H, d, J=7.4Hz), 6.54(1H, s), 6.83-6.98(6H, m), 7.69-7.78(2H, m).

IR(CHCl₃): 3674, 3588, 3438, 3296, 3010, 2948, 2868, 1725, 1646, 1608, 1520, 1504, 1489/cm.

[α]_D²⁰ = +51° (CHCl₃, c=0.91, 25°C)

No. 1m-12

CDCl₃, 300MHz

1.04-2.21(14H, m), 2.33(2H, t, J=8.0Hz), 2.56(1H, m), 3.57(1H, m), 5.28-5.48(2H, m), 5.33(1H, d, J=8.0Hz), 6.75(1H, m), 6.87-6.94(6H, m), 7.56-7.71(2H, m), 9.63(1H, brs).

IR(CHCl₃): 3674, 3582, 3438, 3275, 3010, 2950, 2868, 3675, 1727, 1710(sh), 1643, 1608, 1522, 1504, 1490/cm.

[α]_D²⁰ = +30° (CHCl₃, c=0.97, 25°C)

No. 1m-13

CDCl₃, 300MHz

1.01-2.18(14H, m), 2.31(2H, t, J=7.4Hz), 2.58(1H, m), 3.63(3H, s), 3.82(2H, s), 3.89(1H, m), 5.29-5.48(2H, m), 6.14(1H, d, J=7.0Hz), 6.88-7.08(6H, m), 7.70-7.74(2H, m).

m).

IR(CHCl₃): 3442, 3402, 3004, 2946, 2868, 1727, 1648, 1600, 1518, 1499/cm.

[α]_D²⁰ = +42° (CHCl₃, c = 1.82, 28°C)

No. 1m-14

CDCl₃, 300MHz

1.05-2.21(14H, m), 2.85(2H, t, J = 7.2Hz), 2.85(1H, m), 3.82(2H, s), 3.88(1H, m), 5.2
7-5.48(2H, m), 6.18(1H, d, J = 7.2Hz), 6.88-7.03(2H, m), 7.68-7.78(2H, m).

IR(CHCl₃): 3438, 3012, 2948, 2870, 2850, 1780(sh), 1709, 1647, 1615(sh), 1601, 15
19, 1492/cm.

[α]_D²⁰ = +64° (CHCl₃, c = 0.70, 25°C)

No. 1m-15

CDCl₃, 300MHz

1.05-2.20(14H, m), 2.29-2.36(5H, m), 2.62(1H, m), 3.68(3H, s), 3.92(1H, m), 5.20-5.
50(2H, m), 6.25(1H, d, J = 7.2Hz), 7.16-7.21(2H, m), 7.59-7.64(4H, m), 7.88-7.87(2
H, m).

IR(CHCl₃): 3446, 3010, 2946, 2868, 1745(sh), 1728, 1650, 1615, 1525, 1507, 1488/c
m.

[α]_D²⁰ = +65.0° (CHCl₃, c = 1.02, 23°C)

No. 1m-16

CDCl₃, 300MHz

1.08-2.21(14H, m), 2.34-2.40(5H, m), 2.59(1H, m), 3.90(1H, m), 5.29-5.48(2H, m),
6.29(1H, d, J = 7.0Hz), 7.18(2H, d, J = 8.6Hz), 7.58-7.64(4H, m), 7.88(2H, d, J = 8.2Hz
).

IR(CHCl₃): 3488, 3012, 2948, 2870, 2822, 1749, 1710, 1649, 1610, 1526, 1508, 1487/
cm.

[α]_D²⁰ = +68° (CHCl₃, c = 1.21, 24°C)

No. 1m-17

CDCl₃, 300MHz

1.06-2.19(14H, m), 2.32(2H, t, J = 7.2Hz), 2.62(1H, m), 3.68(2H, s), 3.98(1H, m), 5.8
0-5.80(2H, m), 6.82(1H, d, J = 7.6Hz), 6.41(1H, s), 6.94(2H, d, J = 9.0Hz), 7.47(2H, d,
J = 9.0Hz), 7.58(2H, d, J = 8.6Hz), 7.51(2H, d, J = 8.6Hz).

IR(CHCl₃): 3580, 3484, 3284, 3010, 2948, 2868, 1728, 1648, 1606, 1528, 1490/cm. [

α]_D²⁰ = +62.4° (CHCl₃, c = 1.01, 23°C)

No. 1m-18

CDCl₃+CD₃OD 300MHz

1.11-2.18(14H, m), 2.82(2H, t, J = 7.4Hz), 2.59(1H, m), 3.88(1H, m), 5.20-5.49(2H,
m), 6.85(1H, d, J = 7.0Hz), 6.92(2H, d, J = 8.6Hz), 7.47(2H, d, J = 8.6Hz), 7.59(2H, d, J
= 8.6Hz), 7.79(2H, d, J = 8.2Hz).

IR(Nujol): 3598, 3175, 2725, 1696, 1635, 1601, 1531, 1510/cm.

[α]_D²⁰ = +99.5° (CH₃OH, c = 1.011, 25°C)

No. 1m-19

CDCl₃, 300MHz

1.05-2.20(14H, m), 2.32(2H, t, J = 7.4Hz), 2.61(1H, m), 3.68(2H, s), 3.88(2H, s), 3.94
(1H, m), 5.20-5.50(2H, m), 6.24(1H, d, J = 7.0Hz), 6.99(2H, d, J = 8.6Hz), 7.53-7.62(4
H, m), 7.82(2H, d, J = 8.6Hz).

IR(CHCl₃): 3440, 3006, 2946, 2875, 1728, 1649, 1606, 1527, 1510, 1489/cm.

[α]_D²⁰ = +68° (CHCl₃, c = 0.88, 28°C)

No. 1m-20

CDCl₃, 300MHz

1.09-2.20(14H, m), 2.85(2H, t, J = 7.2Hz), 2.58(1H, m), 3.85(2H, s), 3.89(1H, m), 5.2
8-5.48(2H, m), 6.25(1H, d, J = 7.2Hz), 6.98(2H, d, J = 8.6Hz), 7.51-7.61(4H, m), 7.81(

2H, d, J=9.4Hz), 8.24(1H, brs).

IR(CHCl₃): 8448, 8012, 2952, 2881, 2640, 1780(ab), 1707, 1647, 1606, 1527, 1510, 1489/cm.

[α]_D²⁰ = +53° (CHCl₃, c=1.00, 25°C).

No. 1m-21

CDCl₃, 300MHz

1.05-2.14(14H, m), 2.37(2H, t, J=7.2Hz), 2.51(1H, m), 3.81(1H, m), 5.24-5.46 H, m), 6.11(1H, d, J=7.5Hz), 7.22-7.48(3H, m), 7.53-7.55(2H, m).

IR(CHCl₃): 8420, 8250, 8008, 2948, 2870, 2640, 2210, 1735(ab), 1705, 1645, 1508, 1441, 1402/cm.

[α]_D²⁰ = +59.2 ± 1.0° (CHCl₃, c=1.022, 22°C).

No. 1m-22

CDCl₃, 300MHz

1.05-2.17(14H, m), 2.37(2H, t, J=7.2Hz), 2.52(1H, m), 3.82(1H, m), 5.22-5.47(2H, m), 6.20(1H, d, J=7.6Hz), 7.38-7.53(3H, m), 7.58-7.61(2H, m), 9.11(1H, brs).

IR(CHCl₃): 8420, 8250, 8010, 2984, 2870, 2675, 2208, 1780(ab), 1705, 1640, 1500, 1408/cm.

[α]_D²⁰ = +57.4° (CHCl₃, c=1.83, 23°C).

No. 1m-23

CDCl₃, 300MHz

1.05-2.18(14H, m), 2.31(2H, t, J=7.5Hz), 2.60(1H, m), 3.83(2H, s), 3.90(1H, m), 5.3-5.47(2H, m), 6.22(1H, d, J=8.8Hz), 7.40-7.49(2H, m), 7.76-7.79(2H, m).

IR(CHCl₃): 8436, 8008, 2946, 2868, 1727, 1651, 1603, 1585, 1512, 1484/cm.

[α]_D²⁰ = +52° (CHCl₃, c=1.48, 25°C).

No. 1m-24

CDCl₃, 300MHz

1.05-2.21(14H, m), 2.36(2H, t, J=7.2Hz), 2.57(1H, m), 3.88(1H, m), 5.25-5.47(2H, m), 6.22(1H, d, J=7.0Hz), 7.39-7.55(3H, m), 7.73-7.79(2H, m).

IR(CHCl₃): 8678, 8572, 8486, 8010, 2948, 2875, 1730(ab), 1709, 1650, 1600, 1580, 1514, 1484/cm.

[α]_D²⁰ = +57° (CHCl₃, c=0.97, 25°C).

No. 1m-25

CDCl₃, 300MHz

1.04-2.18(14H, m), 2.28-2.35(5H, m), 2.59(1H, m), 3.62(2H, s), 3.88(1H, m), 5.29-5.49(2H, m), 6.30(1H, d, J=7.2Hz), 7.15(2H, d, J=9.0Hz), 7.50(2H, d, J=8.8Hz).

IR(CHCl₃): 8488, 8010, 2946, 2868, 1752, 1727, 1658, 1602, 1519, 1491/cm.

[α]_D²⁰ = +58° (CHCl₃, c=1.68, 25°C).

No. 1m-26

CDCl₃, 300MHz

1.05-2.19(14H, m), 2.32-2.38(5H, m), 2.56(1H, m), 3.88(1H, m), 5.29-5.47(2H, m), 6.25(1H, d, J=7.4Hz), 7.15(2H, d, J=9.0Hz), 7.78(2H, d, J=8.6Hz).

IR(CHCl₃): 8434, 8016, 8006, 2948, 2880, 2822, 1732, 1730(ab), 1710, 1651, 1605, 1520, 1492/cm.

[α]_D²⁰ = +58° (CHCl₃, c=3.68, 24°C)

No. 1m-27

CDCl₃, 300MHz

1.05-2.16(14H, m), 2.30(2H, t, J=7.5Hz), 2.57(1H, m), 3.62(2H, s), 3.87(1H, m), 5.2-5.47(2H, m), 6.32(1H, d, J=7.4Hz), 6.55(2H, d, J=8.6Hz), 7.42 H, d, J=8.6Hz), 8.85(1H, s).

IR(CHCl₃): 8580, 8450, 8216, 8010, 2948, 2868, 1728, 1640, 1608, 1584, 1528, 1498/cm.

$[\alpha]_D^{25} = +88.2^\circ$ ($\text{CHCl}_3, c = 0.718, 25^\circ\text{C}$)

No. 1m-28

CDCl_3 , 300MHz

1.10-2.25(14H, m), 2.82(2H, t, $J = 7.2\text{Hz}$), 2.55(1H, brs), 3.82-3.98(1H, m), 5.27-5.47(2H, m), 6.25(1H, d, $J = 7.4\text{Hz}$), 6.86(2H, d, $J = 8.6\text{Hz}$), 7.62(2H, d, $J = 8.6\text{Hz}$).

IR(CHCl_3): 3438, 3342, 2975, 1730(sh), 1708, 1639, 1607, 1585/ cm^{-1} .

No. 1m-29

CDCl_3 , 300MHz

1.05-2.18(14H, m), 2.81(2H, t, $J = 7.4\text{Hz}$), 2.58(1H, m), 3.64(3H, s), 3.85(3H, s), 3.89(1H, m), 5.29-5.48(2H, m), 6.14(1H, d, $J = 8.6\text{Hz}$), 6.92(2H, d, $J = 9.0\text{Hz}$), 7.74(2H, d, $J = 9.0\text{Hz}$).

IR(CHCl_3): 3445, 3005, 2946, 2888, 1737, 1646, 1606, 1578, 1528, 1492/ cm^{-1} .

$[\alpha]_D^{25} = +58^\circ$ ($\text{CHCl}_3, c = 2.08, 24^\circ\text{C}$)

No. 1m-30

CDCl_3 , 300MHz

1.04-2.21(14H, m), 2.88(2H, t, $J = 7.8\text{Hz}$), 2.56(1H, m), 3.65(3H, s), 3.88(1H, m), 5.27-5.46(2H, m), 6.15(1H, d, $J = 7.2\text{Hz}$), 6.92(2H, d, $J = 8.6\text{Hz}$), 7.78(2H, d, $J = 8.6\text{Hz}$).

IR(CHCl_3): 3440, 3010, 2950, 2870, 2645, 1727, 1710(sh), 1646, 1606, 1575, 1524, 1484/ cm^{-1} .

$[\alpha]_D^{25} = +62^\circ$ ($\text{CHCl}_3, c = 1.10, 24^\circ\text{C}$).

No. 1m-31

$\text{CDCl}_3 + \text{CD}_3\text{OD}$ 300MHz

1.18-2.30(14H, m), 2.81(2H, t, $J = 7.2\text{Hz}$), 2.59(1H, m), 3.55(1H, m), 5.31-5.51(2H, m), 7.18-7.21(1H, m), 7.31-7.42(2H, m), 7.88-7.98(3H, m).

IR(CHCl_3): 3344, 3175, 2715, 2675, 1699, 1631, 1566/ cm^{-1} .

$[\alpha]_D^{25} = +67^\circ$ ($\text{CH}_3\text{OH}, c = 1.01, 24^\circ\text{C}$).

No. 1m-32

CDCl_3 , 300MHz

1.09-2.28(14H, m), 2.88(2H, t, $J = 7.1\text{Hz}$), 2.57(1H, brs), 3.40-3.98(3H, m), 4.41(1H, brs), 5.29-5.48(2H, m), 6.44(1H, d, $J = 7.4\text{Hz}$), 7.48(2H, d, $J = 8.2\text{Hz}$), 7.80(2H, d, $J = 7.8\text{Hz}$).

IR(CHCl_3): 3434, 3354, 1728, 1720(sh), 1660(sh), 1636/ cm^{-1} .

No. 1m-33

CDCl_3 , 200MHz

1.14-2.25(14H, m), 2.57(2H, t, $J = 7.8\text{Hz}$), 2.64(1H, brs), 3.93-4.01(1H, m), 5.30-5.51(2H, m), 6.47(1H, d, $J = 7.4\text{Hz}$), 7.62-7.74(2H, m), 7.79(2H, s), 7.89-7.98(1H, m), 8.00(1H, dd, $J = 2.3, 1.0\text{Hz}$), 8.30(1H, d, $J = 1.0\text{Hz}$), 8.65-8.72(2H, m).

IR(CHCl_3): 3450, 3375, 1728, 1707, 1649, 1528, 1509/ cm^{-1} .

$[\alpha]_D^{25} = +82.8 \pm 1.2^\circ$ ($\text{CHCl}_3, c = 1.01, 25^\circ\text{C}$).

No. 2a-1

$[\alpha]_D^{25} = +69.0^\circ$ ($\text{MeOH}, c = 1.01, 25^\circ\text{C}$)

No. 2a-2

CDCl_3 , 300MHz

0.99(1H, d, $J = 10.3\text{Hz}$), 1.15 (s) 1.24(2x2 3H, 2x2 s), 1.50-2.50(14H, m), 4.30(1H, m), 5.35-5.52(2H, m), 6.32(1H, d, $J = 8.7\text{Hz}$), 7.88-7.49(3H, m), 7.58-7.62(2H, m), 7.66 (s) 7.80(2x2 2H, 2x2 d, $J = 8.7\text{Hz}$).

IR(CHCl_3): 3116, 3014, 2925, 2870, 2663, 1708, 1651, 1610, 1524, 1504, 1484, 1473/ cm^{-1} .

$[\alpha]_D^{25} = +64.1^\circ$ ($\text{MeOH}, c = 1.02, 25^\circ\text{C}$).

No.2a-3

$[\alpha]_D^{25} = +78.6^\circ$ (MeOH, c=1.15, 25°C).

No.2a-4

CDCl₃, 300MHz

.99(1H, d, J=10.2Hz), 1.15 δ 1.25(각각 2H, 각각 a), 1.64-2.51(14H, m), 4.3
1(1H, m), 5.86-5.88(2H, m), 6.22(1H, d, J=8.4a), 7.50-7.56(2H, m), 7.85-7.98(6H,
m).

IR(CHCl₃): 8515, 8452, 8014, 2925, 2870, 1740, 1708, 1634, 1517, 1488, 147 /cm.

$[\alpha]_D^{25} = +79.5^\circ$ (MeOH, c=1.15, 25°C).

No.2a-5

CD₃OD 300MHz

0.98(1H, d, J=9.9Hz), 1.15 δ 1.25(각각 3H, 각각 a), 1.56-1.71(8H, m), 1.98-2.
40(11H, m), 4.17(1H, m), 5.41-5.52(2H, m), 7.52-7.61(2H, m), 7.91-8.01(6H, m).

IR(KBr): 8418, 3069, 2963, 2921, 2869, 1704, 1642, 1566, 1518, 1488, 1408 /cm.

$[\alpha]_D^{25} = +62.0^\circ$ (MeOH, c=1.00, 25°C).

No.2a-6

$[\alpha]_D^{25} = +64.1^\circ$ (MeOH, c=1.01, 25°C).

No.2a-7

$[\alpha]_D^{25} = +65.3^\circ$ (MeOH, c=0.99, 25°C).

No.2a-8

$[\alpha]_D^{25} = +74.0^\circ$ (MeOH, c=1.01, 25°C).

No.2a-9

$[\alpha]_D^{25} = +71.0^\circ$ (MeOH, c=1.10, 25°C).

No.2a-10

$[\alpha]_D^{25} = +74.7^\circ$ (MeOH, c=1.00, 25°C).

No.2a-11

$[\alpha]_D^{25} = +72.1^\circ$ (MeOH, c=1.00, 25°C).

No.2a-12

$[\alpha]_D^{25} = +52.1^\circ$ (CHCl₃, c=1.01, 25°C).

m.p. 155.0-156.0°C

No.2a-13

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.15 δ 1.25(각각 3H, 각각 a), 1.63-2.40(14H, m), 4.3
0(1H, m), 5.46-5.56(2H, m), 6.44(1H, d, J=8.4Hz), 7.49 δ 7.77(각각 2H, 각각
d, J=8.7Hz), 7.54(1H, s).

IR(CHCl₃): 3689, 3378, 3028, 3014, 2924, 1719, 1652, 1602, 1522, 1498 /cm.

$[\alpha]_D^{25} = +78.3^\circ$ (MeOH, c=0.84, 25°C).

m.p. 205.0-206.0°C

No.2a-14

$[\alpha]_D^{25} = +72.5^\circ$ (MeOH, c=1.07, 25°C).

No.2a-15

CDCl₃, 300MHz

0.99(1H, d, J=9.9Hz), 1.14 δ 1.24(각각 3H, 각각 a), 1.58-2.44(14H, m), 4.27(
1H, m), 5.30-5.50(2H, m), 6.29(1H, d, J=9.0Hz), 7.11 δ 7.20(각각 1H, 각각 d,
J=16.2Hz), 7.39-7.55(6H, m), 7.57 δ 7.72(각각 2H, 각각 d, J=8.7Hz).

IR(CHCl₃): 8452, 8023, 8022, 8018, 2925, 2870, 1708, 1650, 1607, 1560, 1522, 1496

/cm.

$[\alpha]_D^{25} = +72.8^\circ$ (MeOH, $c=1.00, 27^\circ\text{C}$).

m.p. 115.0-117.0°C

No. 2a-16

CDCl_3 , 300MHz

0.92(1H, d, J=10.2Hz), 1.11 (1.23(2H, s), 1.50-2.48(14H, m), 2.6
2(2H, s), 4.29(1H, m), 5.36-5.50(2H, m), 6.30(1H, d, J=8.7Hz), 6.59 (6.68 (2H, s), 7.23(5H, s), 7.29 (7.59(2H, s), 7.74(2H, s), 7.83(2H, s), 7.88(2H, s), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.04(1H, t, J=1.5Hz).

IR(CHCl₃): 3453, 3024, 3016, 2924, 2870, 1730, 1651, 1607, 1520, 1495 /cm.

$[\alpha]_D^{25} = +56.8^\circ$ (MeOH, $c=1.04, 24^\circ\text{C}$).

No. 2a-17

CDCl_3 , 300MHz

0.97(1H, d, J=10.2Hz), 1.11 (1.23(2H, s), 1.50-2.58(14H, m), 4.2
6(1H, m), 5.30-5.50(2H, m), 6.23(1H, d, J=8.4Hz), 6.59 (6.70(2H, s), 7.23(5H, s), 7.29 (7.57(2H, s), 7.74(2H, s), 7.83(2H, s), 7.88(2H, s), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.04(1H, t, J=1.5Hz).

IR(CHCl₃): 3452, 3051, 3019, 3014, 2925, 2870, 2865, 1708, 1650, 1607, 1521, 1495 /cm.

/cm.

$[\alpha]_D^{25} = +61.6^\circ$ (MeOH, $c=1.00, 27^\circ\text{C}$).

No. 2a-18

CDCl_3 , 300MHz

0.97(1H, d, J=10.2Hz), 1.11 (1.23(2H, s), 1.50-2.50(14H, m), 3.61
(3H, s), 4.21(1H, m), 5.25-5.51(2H, m), 6.23(1H, d, J=8.4Hz), 7.48-7.64(4H, m), 7.7
9-7.83(2H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.04(1H, t, J=1.5Hz).

IR(CHCl₃): 3450, 3026, 3018, 2925, 2870, 1730, 1659, 1600, 1510 /cm.

$[\alpha]_D^{25} = +56.0^\circ$ (MeOH, $c=1.01, 25^\circ\text{C}$).

No. 2a-19

CDCl_3 , 300MHz

0.95(1H, d, J=9.9Hz), 1.14 (1.21(2H, s), 1.53-2.60(14H, m), 4.25(1H, m), 5.25-5.64(2H, m), 7.21(1H, d, J=8.5Hz), 7.49-7.68(4H, m), 7.76-7.84(2H, m), 7.85(1H, m), 7.91(1H, dt, J=1.5 and 7.8Hz), 8.01(1H, dt, J=1.5 and 7.8Hz), 8.04(1H, t, J=1.5Hz).

IR(CHCl₃): 3382, 3180, 3025, 3015, 2925, 2870, 1726, 1652, 1609, 1577, 1521 /cm.

$[\alpha]_D^{25} = +55.9^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-20

CDCl_3 , 300MHz

0.98(1H, d, J=10.2Hz), 1.13 (1.24(2H, s), 1.50-2.50(14H, m), 3.6
2(3H, s), 4.31(1H, m), 5.35-5.51(2H, m), 6.24(1H, d, J=8.4Hz), 7.40-7.52(3H, m), 7.71-7.76(2H, m).

IR(CHCl₃): 3453, 3025, 3018, 2925, 2870, 1730, 1753, 1673, 1614, 1488 /cm.

$[\alpha]_D^{25} = +61.2^\circ$ (MeOH, $c=1.04, 25^\circ\text{C}$).

No. 2a-21

CDCl_3 , 300MHz

0.98(1H, d, J=10.2Hz), 1.13 (1.23(2H, s), 1.52-2.50(14H, m), 4.2
8(1H, m), 5.34-5.51(2H, m), 6.27(1H, d, J=8.7Hz), 7.41-7.68(3H, m), 7.71-7.74(2H, m).

IR(CHCl₃): 3452, 3068, 3027, 3014, 2925, 2871, 1708, 1652, 1673, 1515, 1488 /cm.

$[\alpha]_D^{25} = +62.0^\circ$ (MeOH, $c=1.01, 27^\circ\text{C}$).

No. 2a-22

d_6 -DMSO 300MHz

0.86(1H, d, J=9.9Hz), 1.10 (1.16(2H, s), 1.42-1.52(3H, m), 1.85-2.

4.9(1H,m), 3.98(1H,m), 5.22-5.43(2H,m), 7.41(2H,m), 7.88(2H,d,J=8.5Hz), 8.19(1H,d,J=6.5Hz).

IR(KBr): 3367, 3060, 2984, 2922, 2868, 1634, 1563, 1529, 1487/cm.

$[\alpha]_D^{25} = +47.7^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-22

$[\alpha]_D^{25} = +62.7^\circ$ (MeOH, c=1.01, 27°C).

No. 2a-24

CDCl₃, 300MHz

0.99(1H,d,J=10.2Hz), 1.14 (s) 1.25(2H, s), 1.52-2.50(14H,m), 4.3(1H,m), 5.36-5.52(2H,m), 6.34(1H,d,J=8.4Hz), 7.47-7.52(2H,m), 7.59-7.64(1H,m), 7.78-7.83(2H,m).

IR(CHCl₃): 3449, 3027, 3018, 2925, 2869, 1708, 1656, 1599, 1518, 1493 /cm.

$[\alpha]_D^{25} = +63.1^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-25

$[\alpha]_D^{25} = +85.1^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-26

$[\alpha]_D^{25} = +35.5^\circ$ (MeOH, c=1.02, 25°C).

No. 2a-27

CDCl₃, 300MHz

0.97(1H,d,J=10.2Hz), 1.12 (s) 1.23(2H, s), 1.52-2.50(14H,m), 3.6(2H,s), 4.29(1H,m), 5.36-5.51(2H,m), 6.18(1H,d,J=8.4Hz), 7.01 (s) 7.71 (2H, s), 7.84-7.91(2H,m), 7.98-8.05(2H,m), 7.16(1H,t,J=7.5Hz), 7.34-7.41(2H,m).

IR(CHCl₃): 3455, 3024, 3016, 2924, 2870, 1730, 1651, 1588, 1520, 1457 /cm.

$[\alpha]_D^{25} = +86.4^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-28

CDCl₃, 300MHz

0.98(1H,d,J=10.2Hz), 1.12 (s) 1.23(2H, s), 1.52-2.50(14H,m), 4.2(1H,m), 5.34-5.51(2H,m), 6.20(1H,d,J=9.0Hz), 7.01 (s) 7.70(2H, s), 7.84-7.91(2H,m), 7.17(1H,t,J=7.5Hz), 7.34-7.40(2H,m).

IR(CHCl₃): 3454, 3021, 3018, 2926, 2870, 1708, 1650, 1588, 1528, 1457/cm.

$[\alpha]_D^{25} = +86.2^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-29

$[\alpha]_D^{25} = +88.0^\circ$ (MeOH, c=1.03, 25°C).

No. 2a-30

CDCl₃, 300MHz

0.97(1H,d,J=10.2Hz), 1.10 (s) 1.23(2H, s), 1.52-2.50(14H,m), 4.2(1H,m), 5.30-5.50(2H,m), 6.23(1H,d,J=6.7Hz), 6.86(1H,s), 7.36-7.39(10H,m), 7.60 (s) 7.83(2H, s), 7.84-7.91(2H,m), 7.17(1H,t,J=7.5Hz), 7.34-7.40(2H,m).

IR(CHCl₃): 3451, 3058, 3064, 3029, 3014, 2925, 2869, 1707, 1652, 1522, 1495 /cm.

$[\alpha]_D^{25} = +54.2^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-31

CDCl₃, 300MHz

0.98(1H,d,J=10.2Hz), 1.14 (s) 1.24(2H, s), 1.50-2.50(14H,m), 3.6(2H,s), 4.31(1H,m), 5.30-5.50(2H,m), 6.28(1H,d,J=8.4Hz), 6.90(1H,t,J=7.4Hz), 7.13(1H,d,J=8.7Hz), 7.29(2H,t,J=8.0Hz), 7.57-7.76(5H,m), 7.82(1H,s).

IR(ν_{max}): 3380, 3244, 1723, 1633, 1601, 1578, 1525, 1495 /cm.

$[\alpha]_D^{25} = +71.6^\circ$ (MeOH, c=0.50, 25°C).

m.p. 133.0-134.0°C

No.2a-32

$[\alpha]_D^{25} = +56.1^\circ$ (MeOH, c=1.02, 25°C).

No.2a-33

CDCl_3 , 300MHz

0.95(1H, d, J=10.2Hz), 1.10 δ 1.21(2x2 3H, 2x2 s), 1.50-2.50(14H, m), 4.25 (1H, m), 5.13(2H, s), 5.30-5.70(3H, m), 6.41(1H, d, J=8.2Hz), 6.89(1H, s), 7.09(1H, s), 7.17 δ 7.73(2x2 2H, 2x2 d, J=8.2Hz), 7.82(1H, s).

IR(CHCl₃): 3450, 3125, 3081, 3018, 2925, 2870, 2467, 1917, 1708, 1654, 1615, 1575, 1523, 1497 /cm.

$[\alpha]_D^{25} = +55.2^\circ$ (MeOH, c=1.01, 25°C).

No.2a-34

$[\alpha]_D^{25} = +72.9^\circ$ (MeOH, c=1.03, 25°C).

No.2a-35

CDCl_3 , 300MHz

0.98(1H, d, J=10.2Hz), 1.13 δ 1.24(2x2 3H, 2x2 s), 1.52-2.48(14H, m), 4.2 8(1H, m), 5.35-5.51(2H, m), 6.28(1H, d, J=8.7Hz), 7.34-7.37(3H, m), 7.52-7.55(2H, m), 7.58 and 7.71(2x2 2H, 2x2 d, J=8.7Hz).

IR(CHCl₃): 3515, 3452, 3030, 3012, 2925, 2870, 1739, 1708, 1652, 1607, 1555, 1521, 1497 /cm.

$[\alpha]_D^{25} = +74.8^\circ$ (MeOH, c=1.01, 25°C).

No.2a-36

$[\alpha]_D^{25} = +23.4^\circ$ (MeOH, c=1.07, 25°C).

No.2a-37

CDCl_3 , 300MHz

0.82(1H, d, J=10.5Hz), 0.95 δ 1.12(2x2 3H, 2x2 s), 1.44-2.46(14H, m), 3.9 2(1H, m), 5.34-5.52(3H, m), 7.36-7.54(3H, m), 7.62(1H, s).

IR(CHCl₃): 3482, 3310, 3182, 3025, 3014, 2924, 2870, 1704, 1610, 1594, 1528, 1487 /cm.

$[\alpha]_D^{25} = +25.3^\circ$ (MeOH, c=1.00, 25°C).

No.2a-38

$[\alpha]_D^{25} = +70.9^\circ$ (MeOH, c=1.02, 25°C).

No.2a-39

$[\alpha]_D^{25} = +70.6^\circ$ (MeOH, c=1.01, 25°C).

No.2a-40

$[\alpha]_D^{25} = +74.7^\circ$ (MeOH, c=1.00, 25°C).

No.2a-41

$[\alpha]_D^{25} = +72.1^\circ$ (MeOH, c=1.01, 24°C).

No.2a-42

$[\alpha]_D^{25} = +68.2^\circ$ (MeOH, c=1.00, 25°C).

No.2a-43

$[\alpha]_D^{25} = +70.8^\circ$ (MeOH, c=1.00, 25°C).

No.2a-44

$[\alpha]_D^{25} = +80.4^\circ$ (MeOH, c=1.00, 25°C).

No.2a-45

CDCl₃, 300MHz

0.97(1H, d, J=9.9Hz), 1.13 δ 1.23(2H, s), 1.55-2.52(14H, m), 4.29(1H, m), 5.34-5.54(2H, m), 6.32(1H, d, J=9.0Hz), 7.10(1H, t, J=7.4Hz), 7.34(2H, t, J=7.4Hz), 7.52(2H, m), 7.68 δ 7.75(2H, s), 7.80(1H, s), 8.10(1H, s), 10.09(1H, s).

IR(CHCl₃): 2893, 2195, 2093, 2023, 2019, 2925, 2870, 1698, 1654, 1598, 1587, 1498 /cm.

[α]_D²⁰ = +59.4° (MeOH, c=1.01, 24°C).

No. 2a-46

[α]_D²⁰ = +53.5° (MeOH, c=1.00, 25°C).

No. 2a-47

CDCl₃, 300MHz

0.97(1H, d, J=9.9Hz), 1.13 δ 1.23(2H, s), 1.54-2.48(14H, m), 4.29(1H, m), 5.35-5.52(2H, m), 6.32(1H, d, J=8.7Hz), 7.36(1H, m), 7.41(2H, t, J=7.5Hz), 7.64(2H, d, J=7.5Hz), 7.73 δ 7.77(2H, s), 7.95(1H, s), 9.20(1H, s), 10.38(1H, s).

IR(CHCl₃): 2450, 2389, 2003, 2992, 2925, 2870, 1708, 1653, 1596, 1523, 1495 /cm.

[α]_D²⁰ = +62.3° (MeOH, c=1.00, 25°C).

No. 2a-48

[α]_D²⁰ = +63.8° (MeOH, c=1.00, 24°C).

No. 2a-49

CDCl₃, 300MHz

1.00(1H, d, J=10.5Hz), 1.17 δ 1.26(2H, s), 1.55-2.52(14H, m), 4.34(1H, m), 5.38-5.54(2H, m), 6.35(1H, d, J=9.0Hz), 7.50-7.62(2H, m), 7.90 δ 8.33(2H, s), 8.21(2H, m).

IR(CHCl₃): 2451, 2029, 2022, 2016, 2925, 2870, 1708, 1655, 1542, 1508, 1492, 1471, 1459 /cm.

[α]_D²⁰ = +62.5° (MeOH, c=1.02, 25°C).

m.p. 135.0-137.0°C

No. 2a-50

[α]_D²⁰ = +68.9° (MeOH, c=1.01, 24°C).

No. 2a-51

d₆-DMSO 300MHz

0.87(1H, d, J=9.9Hz), 1.10 δ 1.17(2H, s), 1.40-1.60(2H, m), 1.90-2.40(11H, m), 2.98(1H, m), 5.35-5.46(2H, m), 7.64(1H, s), 7.65 δ 7.91(2H, s), 8.08(1H, d, J=8.7Hz), 9.32(1H, brs).

IR(KBr): 2385, 2962, 1734, 1707, 1622, 1529, 1498 /cm.

[α]_D²⁰ = +68.4° (MeOH, c=1.01, 24°C).

No. 2a-52

[α]_D²⁰ = +76.2° (MeOH, c=1.01, 24°C).

No. 2a-53

[α]_D²⁰ = +73.9° (MeOH, c=1.02, 24°C).

No. 2a-54

[α]_D²⁰ = +68.1° (MeOH, c=1.00, 24°C).

No. 2a-55

[α]_D²⁰ = +67.8° (MeOH, c=1.00, 24°C).

No. 2a-56

$[\alpha]_D^{25} = +85.4^\circ$ (MeOH, $c=1.08, 25^\circ$).

No. 2a-57

$[\alpha]_D^{25} = +63.4^\circ$ (MeOH, $c=1.01, 24^\circ$).

No. 2a-58

$[\alpha]_D^{25} = +68.6^\circ$ (MeOH, $c=1.01, 24^\circ$).

No. 2a-59

$[\alpha]_D^{25} = +55.5^\circ$ (MeOH, $c=1.00, 24^\circ$).

No. 2a-60

$[\alpha]_D^{25} = +60.9^\circ$ (MeOH, $c=1.02, 25^\circ$).

No. 2a-61

$CDCl_3$, 300MHz

0.97(1H, d, $J=10.0$ Hz), 1.10 δ 1.22(작작 3H, 작작 a), 1.50-2.50(14H, m), 4.2
6(1H, m), 5.30-5.54(2H, m), 5.28(1H, d, $J=8.6$ Hz), 5.60 δ 5.82(작작 1H, 작작
d, $J=12.4$ Hz), 7.12(2H, d, $J=8.0$ Hz), 7.25 δ 7.82(작작 2H, 작작 d, $J=8.6$ Hz
) , 8.47(2H, d, $J=6.0$ Hz).

IR(CHCl₃): 3452, 3027, 3019, 3013, 2925, 2870, 2480, 1708, 1651, 1605, 1520, 1494
/cm.

$[\alpha]_D^{25} = +61.6^\circ$ (MeOH, $c=1.01, 25^\circ$).

No. 2a-62

$[\alpha]_D^{25} = +72.0^\circ$ (MeOH, $c=0.93, 25^\circ$).

No. 2a-63

$CDCl_3$, 300MHz

0.99(1H, d, $J=10.2$ Hz), 1.14 δ 1.24(작작 3H, 작작 a), 1.50-2.50(14H, m), 4.2
9(1H, m), 5.36-5.55(2H, m), 5.35(1H, d, $J=9.1$ Hz), 7.04 δ 7.27(작작 1H, 작작
d, $J=16.5$ Hz), 7.37(2H, d, $J=6.6$ Hz), 7.56 δ 7.76(작작 2H, 작작 d, $J=8.4$ Hz),
8.57(2H, d, $J=6.6$ Hz).

IR(CHCl₃): 3452, 3024, 3018, 3014, 2925, 2870, 2470, 1953, 1709, 1652, 1605, 1521,
1496 /cm.

$[\alpha]_D^{25} = +69.2^\circ$ (MeOH, $c=1.01, 25^\circ$).

No. 2a-64

$[\alpha]_D^{25} = +56.9^\circ$ (MeOH, $c=1.24, 25^\circ$).

No. 2a-65

$CDCl_3$, 300MHz

0.98(1H, d, $J=10.5$ Hz), 1.12 δ 1.23(작작 3H, 작작 a), 1.54-2.46(14H, m), 4.2
7(1H, m), 5.22(2H, s), 5.34-5.52(2H, m), 5.28(1H, d, $J=8.4$ Hz), 7.32-7.45(5H, m), 7.
84 δ 7.71(작작 2H, 작작 d, $J=8.4$ Hz), 8.15(1H, s).

IR(CHCl₃): 3452, 3028, 3055, 3032, 3013, 2925, 2870, 1708, 1653, 1611, 1559, 1522,
1496 /cm.

$[\alpha]_D^{25} = +61.0^\circ$ (MeOH, $c=0.91, 25^\circ$).

No. 2a-66

$[\alpha]_D^{25} = +76.0^\circ$ (MeOH, $c=1.01, 25^\circ$).

No. 2a-67

$CDCl_3$, 300MHz

0.98(1H, d, $J=10.4$ Hz), 1.14 δ 1.24(작작 3H, 작작 a), 1.54-2.46(14H, m), 4.2
8(1H, m), 5.22-5.53(2H, m), 5.27(1H, d, $J=8.6$ Hz), 5.92-7.31(작작 1H, 작작 d, $J=$
15.4Hz), 7.02(1H, dd, $J=5.8$ δ 8.6Hz), 7.12(1H, d, $J=8.6$ Hz), 7.24(1H, d, $J=5.8$
Hz), 7.51 δ 7.70(작작 2H, 작작 d, $J=8.4$ Hz).

IR(CHCl₃): 3453, 3029, 3018, 2925, 2870, 1789, 1650, 1604, 1524, 1515, 1494 /cm.
[α]_D²⁰ = +76.2° (MeOH, c=1.00, 24°C).
m.p. 104.0-108.0°C

No. 2a-68
[α]_D²⁰ = +57.7° (MeOH, c=1.01, 25°C).

No. 2a-6
CDCl₃, 300MHz
0.99(1H, d, J=10.2Hz), 1.14 ㉞ 1.24(㉞㉞ 3H, ㉞㉞ a), 1.54-2.48(14H, m), 4.2
8(1H, m), 5.34-5.53(2H, m), 6.29(1H, d, J=9.0Hz), 6.54-6.74(㉞㉞ 1H, ㉞㉞ d, J=
12.0Hz), 7.02(1H, dd, J=4.8 ㉞ 3.3Hz), 6.97(1H, dd, J=8.3 ㉞ 1.2Hz), 7.18(1
H, dd, J=4.8 ㉞ 1.2Hz), 7.44 ㉞ 7.70(㉞㉞ 2H, ㉞㉞ d, J=8.7Hz).
IR(CHCl₃): 3453, 3023, 3010, 2925, 2870, 1705, 1650, 1607, 1559, 1525, 1492 /cm.
[α]_D²⁰ = +58.4° (MeOH, c=1.00, 25°C).

No. 2a-70
[α]_D²⁰ = +48.8° (MeOH, c=1.00, 25°C).

No. 2a-71
CDCl₃, 300MHz
0.98(1H, d, J=10.2Hz), 1.12 ㉞ 1.23(㉞㉞ 3H, ㉞㉞ a), 1.53-2.48(14H, m), 2.3
1(3H, s), 4.26(1H, m), 5.38-5.52(2H, m), 6.20(1H, d, J=9.3Hz), 7.02-7.11(8H, m), 7.
70(2H, d, J=9.0Hz).
IR(CHCl₃): 3460, 3031, 3022, 3011, 2925, 2870, 1750, 1708, 1650, 1608, 1597, 1523,
1490 /cm.
[α]_D²⁰ = +48.9° (MeOH, c=1.01, 25°C).

No. 2a-72
[α]_D²⁰ = +51.3° (MeOH, c=1.02, 25°C).

No. 2a-73
CDCl₃, 300MHz
0.97(1H, d, J=9.8Hz), 1.11 ㉞ 1.23(㉞㉞ 3H, ㉞㉞ a), 1.54-2.48(14H, m), 4.27(
1H, m), 5.32-5.52(2H, m), 6.24(1H, d, J=9.0Hz), 6.83-6.94(6H, m), 7.65(2H, d, J=9.
0Hz).
IR(CHCl₃): 3595, 3451, 3199, 3032, 3012, 2925, 2870, 1708, 1642, 1604, 1524, 1507,
1491 /cm.
[α]_D²⁰ = +52.2° (MeOH, c=1.01, 25°C).

No. 2a-74
[α]_D²⁰ = +51.5° (MeOH, c=0.92, 25°C).

No. 2a-75
CDCl₃, 300MHz
0.97(1H, d, J=10.2Hz), 1.11 ㉞ 1.23(㉞㉞ 3H, ㉞㉞ a), 1.55-2.48(14H, m), 3.8
2(3H, s), 4.35(1H, m), 5.32-5.52(2H, m), 6.19(1H, d, J=9.7Hz), 6.89-7.01(6H, m), 7.
65-7.68(2H, m).
IR(CHCl₃): 3460, 3025, 3008, 2925, 2870, 2837, 1741, 1649, 1612, 1521, 1505, 1490
/cm.
[α]_D²⁰ = +51.1° (MeOH, c=1.00, 25°C).

No. 2a-76
[α]_D²⁰ = +60.4° (MeOH, c=0.98, 25°C).

No. 2a-77
CDCl₃, 300MHz
0.99(1H, d, J=10.5Hz), 1.15 ㉞ 1.24(㉞㉞ 3H, ㉞㉞ a), 1.54-2.48(14H, m), 2.3

4.29(1H,m), 5.32-5.54(2H,m), 6.32(1H,d,J=8.4Hz), 7.19 및 7.80 (각각 2H, 각각 d,J=8.4Hz), 7.68 및 7.79(각각 2H, 각각 d,J=8.4Hz).
IR(CHCl₃): 3452, 3027, 3012, 2925, 2870, 1751, 1709, 1651, 1611, 1600, 1527, 1509, 1489 /cm.
[α]_D²⁰ = +61.3° (MeOH, c=1.00, 25°C).

No. 2a-78

[α]_D²⁰ = +67.4° (MeOH, c=1.01, 25°C).

No. 2a-79

CDCl₃, 300MHz

0.99(1H,d,J=10.2Hz), 1.15 및 1.24(각각 3H, 각각 s), 1.54-2.54(14H,m), 4.3
1(1H,m), 5.32-5.54(2H,m), 6.36(1H,d,J=8.2Hz), 6.98 및 7.48(각각 2H, 각각
d,J=8.6Hz), 7.59 및 7.75(각각 2H, 각각 d,J=8.4Hz).
IR(CHCl₃): 3598, 3448, 3192, 3030, 3010, 2925, 2870, 1708, 1644, 1608, 1591, 1559,
1530, 1518, 1491 /cm.
[α]_D²⁰ = +65.8° (MeOH, c=1.01, 25°C).

No. 2a-80

[α]_D²⁰ = +66.9° (MeOH, c=1.01, 25°C).

No. 2a-81

CDCl₃, 300MHz

0.99(1H,d,J=10.5Hz), 1.15 및 1.24(각각 3H, 각각 s), 1.54-2.48(14H,m), 3.8
6(3H,s), 4.29(1H,m), 5.34-5.52(2H,m), 6.30(1H,d,J=8.7Hz), 6.99 및 7.55 (각각
2H, 각각 d,J=9.0Hz), 7.61 및 7.77(각각 2H, 각각 d,J=8.7Hz).
IR(CHCl₃): 3460, 3009, 2925, 2870, 2838, 1740, 1708, 1650, 1608, 1557, 1538, 1512,
1491 /cm.
[α]_D²⁰ = +66.2° (MeOH, c=1.01, 25°C).

No. 2a-82

[α]_D²⁰ = +67.7° (MeOH, c=1.08, 24°C).

No. 2a-83

CDCl₃, 300MHz

0.97(1H,d,J=10.3Hz), 1.12 및 1.23(각각 3H, 각각 s), 1.54-2.48(14H,m), 3.3
3(3H,s), 4.28(1H,m), 5.32-5.52(2H,m), 6.26(1H,d,J=8.7Hz), 7.16 및 7.75 (각각
2H, 각각 d,J=8.7Hz).
IR(CHCl₃): 3462, 3030, 3022, 3012, 2925, 2870, 1754, 1709, 1654, 1604, 1585, 1522,
1495 /cm.
[α]_D²⁰ = +57.4° (MeOH, c=1.01, 24°C).

No. 2a-84

[α]_D²⁰ = +57.8° (MeOH, c=1.01, 24°C).

No. 2a-85

CDCl₃, 300MHz

0.95(1H,d,J=10.2Hz), 1.12 및 1.22(각각 3H, 각각 s), 1.54-2.48(14H,m), 4.2
5(1H,m), 5.32-5.52(2H,m), 6.28(1H,d,J=8.7Hz), 6.87 및 7.57(각각 2H, 각각
d,J=9.0Hz).
IR(CHCl₃): 3590, 3450, 3168, 3019, 3012, 2925, 2871, 1708, 1637, 1608, 1588, 1581,
1498 /cm.
[α]_D²⁰ = +56.0° (MeOH, c=1.01, 24°C).

No. 2a-86

[α]_D²⁰ = +59.8° (MeOH, c=1.01, 23°C).

No. 2a-87

CDCl_3 , 300MHz

0.98(1H, d, $J=10.0\text{Hz}$), 1.18 H 1.28(2H, s, $J=10.0\text{Hz}$), 1.54-2.48(14H, m), 3.8
5(2H, s), 4.25(1H, m), 5.22-5.58(2H, m), 6.19(1H, d, $J=8.8\text{Hz}$), 6.98 H 7.69
(2H, s, $J=9.0\text{Hz}$).

IR(CHCl_3): 3460, 3080, 3017, 3012, 2925, 2870, 2840, 1740, 1708, 1647, 1606, 1575,
1525, 1498 cm^{-1} .

$[\alpha]_D^{25} = +55.2^\circ$ (MeOH, $c=0.98$, 25°C).

No. 2a-88

$[\alpha]_D^{25} = +50.9^\circ$ (MeOH, $c=1.02$, 25°C).

No. 2a-89

CDCl_3 , 300MHz

0.98(1H, d, $J=10.2\text{Hz}$), 1.18 H 1.26(2H, s, $J=10.2\text{Hz}$), 1.56-2.48(14H, m), 4.2
9(1H, m), 5.36-5.54(2H, m), 7.03(1H, d, $J=8.7\text{Hz}$), 7.21(1H, s), 7.43(2H, m), 7.74(1
H, dd, $J=1.8, 8.9$ H 8.7Hz), 8.22(1H, dd, $J=1.8$ H 8.1Hz).

IR(CHCl_3): 3448, 3087, 3023, 3014, 2925, 2870, 1708, 1685, 1658, 1630, 1517, 1466
 cm^{-1} .

$[\alpha]_D^{25} = +57.1^\circ$ (MeOH, $c=1.01$, 25°C).

m.p. 117.0-118.0 $^\circ\text{C}$

No. 2a-90

$[\alpha]_D^{25} = +54.1^\circ$ (MeOH, $c=1.01$, 25°C).

No. 2a-91

CDCl_3 , 300MHz

0.97(1H, d, $J=10.2\text{Hz}$), 1.18 H 1.28(2H, s, $J=10.2\text{Hz}$), 1.52-2.46(14H, m), 4.2
4(1H, m), 5.34-5.52(2H, m), 5.49-5.63(2H, m), 7.11(1H, dd, $J=0.9$ and 8.6Hz), 7.4
4(1H, dd, $J=0.9$ H 1.8Hz).

IR(CHCl₃): 3497, 3033, 3022, 3014, 2925, 2870, 1789, 1708, 1655, 1595, 1520, 1472

/cm.

[α]_D = +55.0° (MeOH, c = 1.00, 23°C).

No. 2a-92

[α]_D = +50.8° (MeOH, c = 1.00, 23°C).

No. 2a-93

CDCl₃, 800MHz:

0.95(1H, d, J = 10.5Hz), 1.12 ㉞ 1.23(㉞㉞ 8H, ㉞㉞ a), 1.52-2.46(14H, m), 4.2
5(1H, m), 5.34-5.52(2H, m), 6.12(1H, d, J = 8.7Hz), 7.07(1H, dd, J = 3.9 ㉞ 8.1Hz),
7.45-7.48(2H, m).

IR(CHCl₃): 3450, 3023, 3011, 2925, 2870, 1789, 1708, 1645, 1531, 1501, 1471 /cm.

[α]_D = +49.1° (MeOH, c = 1.02, 24°C).

No. 2a-94

[α]_D = +51.5° (MeOH, c = 1.00, 24°C).

No. 2a-95

CDCl₃, 800MHz:

0.96(1H, d, J = 10.5Hz), 1.11 ㉞ 1.23(㉞㉞ 8H, ㉞㉞ a), 1.52-2.46(14H, m), 4.2
5(1H, m), 5.34-5.56(2H, m), 6.14(1H, d, J = 8.7Hz), 7.34(2H, d, J = 2.0Hz), 7.85(1H, t,
J = 2.0Hz).

IR(CHCl₃): 3452, 3114, 3080, 3013 2925, 2870, 1708, 1649, 1535, 1498, 1471 /cm.

[α]_D = +55.5° (MeOH, c = 1.00, 25°C).

m.p. 87.0-88.0°C

No. 2a-96

CD₃OD 800MHz:

0.94(1H,d,J=10.3Hz),1.13 ㉡ 1.22(㉡㉡ 3H,㉡㉡ a),1.50-1.76(3H,m),1.94-2.39(1H,m),4.11(1H,m),5.39-5.49(2H,m),7.42-7.51(2H,m),8.05(1H,m).
IR(KBr):3369,3064,2955,2921,2868,1690,1566,1538,1503 /cm.
[α]_D²⁰=+38.8° (MeOH,c=1.01,23°C).

No.2a-97

CDCl₃ 300MHz

0.92(1H,d,J=9.9Hz),1.18 ㉡ 1.22(㉡㉡ 3H,㉡㉡ a),1.48-1.58(3H,m),1.98-2.36(1H,m),4.10(1H,m),5.35-5.50(2H,m),7.42-7.51(2H,m),8.06(1H,m).
IR(KBr):3447,3087,2987,2922,2868,1629,1545,1501 /cm.
[α]_D²⁰=+52.9° (MeOH,c=1.01,24°C).

No.2a-98

[α]_D²⁰=+53.2° (MeOH,c=1.02,23°C).

No.2a-99

CDCl₃ 300MHz

0.97(1H,d,J=10.2Hz),1.12 ㉡ 1.22(㉡㉡ 3H,㉡㉡ a),1.26-2.45(24H,m),4.25(2H,m),5.24-5.52(2H,m),6.18(1H,d,J=8.7Hz),6.91 ㉡ 7.66(㉡㉡ 2H,㉡㉡ d,J=9.0Hz).
IR(CHCl₃):3455,3029,3019,2939,2862,1738,1709,1645,1605,1528,1494 /cm.
[α]_D²⁰=+51.4° (MeOH,c=1.00,23°C).

No.2a-100

[α]_D²⁰=+49.3° (MeOH,c=1.00,24°C).

No.2a-101

[α]_D²⁰=+51.3° (MeOH,c=1.00,24°C).

No.2a-102

[α]_D²⁰=+48.8° (MeOH,c=1.01,23°C).

No.2a-103

CDCl₃ 300MHz

0.94(1H,d,J=10.3Hz),1.12 ㉡ 1.22(㉡㉡ 3H,㉡㉡ a),1.52-2.46(14H,m),2.48(3H,d,J=0.3Hz),4.20(1H,m),5.32-5.54(2H,m),6.46(1H,brs),7.12(1H,d,J=9.0Hz).
IR(CHCl₃):3415,3144,3029,3011,2926,2871,1706,1671,1598,1538,14564 /cm.
[α]_D²⁰=+49.6° (MeOH,c=1.01,23°C).

No.2a-104

[α]_D²⁰=+77.0° (MeOH,c=1.02,23°C).

No.2a-105

CDCl₃ 300MHz

98(1H,d,J=9.9Hz),1.09 ㉡ 1.21(㉡㉡ 3H,㉡㉡ a),1.51-2.44(14H,m),2.90(6H,s),4.20(1H,m),5.38-5.50(2H,m),5.87(1H,d,J=9.0Hz),6.28 ㉡ 7.54(㉡㉡ 1H,㉡㉡ d,J=15.6Hz),6.84(1H,d,J=8.1Hz),7.03(1H,d,J=1.8Hz),7.09(1H,dd,J=1.8 ㉡ 8.1Hz).
IR(CHCl₃):3439,3028,3012,2927,2871,2841,1739,1708,1661,1630,1600,1512 /cm.
[α]_D²⁰=+77.3° (MeOH,c=1.01,23°C).

No.2a-106

[α]_D²⁰=+67.0° (MeOH,c=1.00,23°C).

No.2a-107

$[\alpha]_D^{25} = +68.6^\circ$ (MeOH, $c = 1.01, 24^\circ$).
m.p. 168.0-170.0°C

No. 2a-108

$[\alpha]_D^{25} = +61.8^\circ$ (MeOH, $c = 1.00, 23^\circ$).

No. 2a-109

$CDCl_3$, 300MHz

0.96(1H, d, $J = 10.2$ Hz), 1.10 δ 1.22(2H, s), 1.51-2.46(14H, m), 4.2
5(1H, m), 5.38-5.49(2H, m), 6.31(1H, d, $J = 8.7$ Hz), 7.25 δ 7.60(2H, s),
d, $J = 8.7$ Hz), 7.33-7.41(5H, s).

IR($CHCl_3$): 3452, 3062, 3022, 3014, 2925, 2870, 1789, 1708, 1651, 1594, 1557, 1515,
1481 cm^{-1} .

$[\alpha]_D^{25} = +61.0^\circ$ (MeOH, $c = 1.01, 22^\circ$).

No. 2a-110

CD_3OD , 300MHz

0.94(1H, d, $J = 9.9$ Hz), 1.13 δ 1.22(2H, s), 1.54-2.87(14H, m), 4.12(
1H, m), 5.38-5.49(2H, m), 7.25 δ 7.68(2H, s), d, $J = 8.7$ Hz), 7.41(5H, s)

IR(KBr): 3485, 3058, 2920, 2868, 1635, 1595, 1562, 1521, 1482, 1439, 1411 cm^{-1} .

$[\alpha]_D^{25} = +47.8^\circ$ (MeOH, $c = 1.01, 23^\circ$).

No. 2a-111

$[\alpha]_D^{25} = +55.6^\circ$ (MeOH, $c = 1.01, 24^\circ$).

No. 2a-112

$CDCl_3$, 300MHz

0.97(1H, d, $J = 10.2$ Hz), 1.12 δ 1.23(2H, s), 1.51-2.46(14H, m), 4.2
7(1H, m), 5.35-5.50(2H, m), 6.22(1H, d, $J = 8.4$ Hz), 7.40 δ 7.68(2H, s),
d, $J = 9.0$ Hz).

IR($CHCl_3$): 3459, 3028, 3012, 2937, 2871, 2841, 1729, 1708, 1661, 1620, 1600, 1518
 cm^{-1} .

$[\alpha]_D^{25} = +65.6^\circ$ (MeOH, $c = 1.01, 22^\circ$).

No. 2a-113

$[\alpha]_D^{25} = +59.6^\circ$ (MeOH, $c = 1.00, 24^\circ$).

No. 2a-114

$CDCl_3$, 300MHz

0.98(1H, d, $J = 10.2$ Hz), 1.12 δ 1.24(2H, s), 1.52-2.46(14H, m), 4.2
9(1H, m), 5.35-5.51(2H, m), 6.23(1H, d, $J = 8.4$ Hz), 7.70 δ 7.83(2H, s),
d, $J = 8.4$ Hz).

IR($CHCl_3$): 3439, 3028, 3012, 2937, 2871, 2841, 1729, 1708, 1661, 1620, 1600, 1518
 cm^{-1} .

$[\alpha]_D^{25} = +60.6^\circ$ (MeOH, $c = 1.01, 22^\circ$).

No. 2a-115

$[\alpha]_D^{25} = +59.7^\circ$ (MeOH, $c = 0.99, 24^\circ$).

No. 2a-116

$CDCl_3$, 300MHz

0.97(1H, d, $J = 10.2$ Hz), 1.12 δ 1.23(2H, s), 1.52-2.46(14H, m), 2.3
9(2H, s), 4.27(1H, m), 5.35-5.51(2H, m), 6.34(1H, d, $J = 9.0$ Hz), 7.23 δ 7.62
(2H, s), d, $J = 8.4$ Hz).

IR($CHCl_3$): 3459, 3028, 3012, 2937, 2871, 2841, 1729, 1708, 1661, 1620, 1600, 1518
 cm^{-1} .

$[\alpha]_D^{25} = +59.7^\circ$ (MeOH, c=0.99, 24°C).

No. 2a-117

$[\alpha]_D^{25} = +56.7^\circ$ (MeOH, c=1.0, 22°C).

No. 2a-118

CDCl₃, 300MHz

0.96(1H, d, J=10.2Hz), 1.11 δ 1.23(2x 3H, 2x 3H), 1.53-2.44(14H, m), 4.2
3(1H, m), 5.34-5.51(2H, m), 6.02(2H, s), 6.19(1H, d, J=8.7Hz), 6.89(1H, dd, J=1.2
 δ 7.5Hz), 7.22-7.25(2H, m).

IR(CHCl₃): 3452, 3081, 3020, 3012, 2924, 2870, 1746, 1705, 1650, 1619, 1605, 1519,
1504, 1489 /cm.

$[\alpha]_D^{25} = +57.2^\circ$ (MeOH, c=1.02, 23°C).

No. 2a-119

CDCl₃, 300MHz

0.96(1H, d, J=10.5Hz), 1.07 δ 1.23(2x 3H, 2x 3H), 1.51-2.44(14H, m), 2.2
2(3H, s), 4.26(1H, m), 5.37-5.52(2H, m), 6.40(1H, d, J=9.0Hz), 7.09(1H, m), 7.30(1
H, m), 7.46(1H, m), 7.66(1H, m).

IR(CHCl₃): 3443, 3028, 3012, 2925, 2870, 1768, 1747, 1709, 1657, 1607, 1516, 1479
/cm.

$[\alpha]_D^{25} = +58.2^\circ$ (MeOH, c=0.99, 21°C).

No. 2a-120

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.14 δ 1.24(2x 3H, 2x 3H), 1.53-2.44(14H, m), 4.3
0(1H, m), 5.35-5.52(2H, m), 6.42(1H, d, J=8.7Hz), 6.86(1H, m), 6.99(1H, dd, J=1.2
 δ 8.4Hz), 7.27(1H, m), 7.39(1H, m).

IR(CHCl₃): 3453, 3033, 3021, 3014, 2992, 2924, 2870, 1708, 1643, 1597, 1523, 1489

/cm.

$[\alpha]_D^{25} = +48.3^\circ$ (MeOH, c=1.01, 21°C).

No. 2a-121

CDCl₃, 300MHz

0.98(1H, d, J=10.2Hz), 1.14 δ 1.23(2x 3H, 2x 3H), 1.47-2.47(14H, m), 3.9
5(3H, s), 4.31(1H, m), 5.32-5.50(2H, m), 6.98(1H, dd, J=0.9 δ 8.4Hz), 7.09(1H,
ddd, J=0.9, 7.7 δ 8.4Hz), 7.45(1H, m), 8.19(1H, dd, J=2.1 δ 8.1Hz), 8.32(1
H, d, J=9.0Hz).

IR(CHCl₃): 3400, 3078, 3028, 3020, 3007, 2924, 2870, 2842, 1738, 1708, 1640, 1600,
1586, 1483, 1470 /cm.

$[\alpha]_D^{25} = +55.1^\circ$ (MeOH, c=1.02, 23°C).

No. 2a-122

$[\alpha]_D^{25} = +42.3^\circ$ (MeOH, c=0.99, 23°C).

No. 2a-123

$[\alpha]_D^{25} = +38.7^\circ$ (MeOH, c=1.00, 21°C).

No. 2a-124

$[\alpha]_D^{25} = +45.0^\circ$ (MeOH, c=1.01, 21°C).

m.p. 119.0-120.0°C

No. 2a-125

$[\alpha]_D^{25} = +49.8^\circ$ (MeOH, c=1.01, 22°C).

No. 2a-126

CDCl₃, 300MHz

0.97(1H, d, J=10.2Hz), 1.11 δ 1.23(2x 3H, 2x 3H), 1.52-2.47(14H, m), 4.2

8(1H,m),5.34-5.50(2H,m),6.22(1H,d,J=8.7Hz),7.55-7.61(4H,m).
IR(CHCl₃):3400,3072,3028,3007,2934,2870,2842,1788,1708,1640,1600,
1586,1482,1470 /cm.
[α]_D²⁰=+88.0° (MeOH,c=1.01,23°C).

5

No.2a-127

CDCl₃, 800MHz

0.91(1H,d,J=10.2Hz),1.10 ㉞ 1.20(㉞㉞ 2H,㉞㉞ a),1.50-2.42(14H,m),4.2
8(1H,m),5.31-5.51(2H,m),6.45(1H,d,J=8.4Hz),7.01(1H,t,J=7.4Hz),7.22-7.27(
10 2H,m),7.33-7.40(4H,m),7.53(2H,d,J=9.0Hz),8.30 ㉞ 8.48(㉞㉞ 1H,㉞㉞ a)

IR(CHCl₃):3452,3028,3022,3015,2925,2870,1708,1654,1590,1514,1478 /cm.
[α]_D²⁰=+89.5° (MeOH,c=1.01,23°C).

15 No.2a-128

d₆-DMSO 800MHz

0.84(1H,d,J=9.9Hz),1.06 ㉞ 1.19(㉞㉞ 2H,㉞㉞ a),1.37-2.37(14H,m),2.79(
1H,m),5.35-5.51(2H,m),6.05(1H,d,J=8.7Hz),6.85-6.90(1H,m),7.18-7.28(2H,m)
,7.35-7.38(2H,m),8.42(1H,a),12.00(1H,a).

20 IR(㉞㉞):3395,3345,2925,2866,2823,2508,1697,1658,1638,1597,1557 /cm.
[α]_D²⁰=+26.0° (MeOH,c=1.01,23°C).
m.p.164.0-166.0°C

No.2a-129

25 CDCl₃, 800MHz

1.01(1H,d,J=10.0Hz),1.17 ㉞ 1.25(㉞㉞ 2H,㉞㉞ a),1.54-2.52(14H,m),4.3
4(1H,m),5.36-5.57(2H,m),6.42(1H,d,J=8.6Hz),7.51-7.60(2H,m),7.77(1H,dd,J
=1.8 ㉞ 8.6Hz),7.85-7.96(2H,m),8.24(1H,bre).

IR(CHCl₃):3451,3060,3028,3010,2925,2870,1706,1652,1629,1600,1517,1502

/cm.

[α]_D²⁰=+68.6° (MeOH,c=1.00,23°C).

No.2a-130

CDCl₃, 800MHz

1.02(1H,d,J=10.2Hz),1.04 ㉞ 1.28(㉞㉞ 2H,㉞㉞ a),1.54-2.52(14H,m),4.4
1(1H,m),5.41-5.58(2H,m),6.14(1H,d,J=8.0Hz),7.43-7.59(4H,m),7.85-7.92(2H,
m),8.27(1H,dd,J=1.8 ㉞ 7.2Hz).

IR(CHCl₃):3488,3082,3010,2924,2870,2864,1708,1652,1512,1498 /cm.

[α]_D²⁰=+93.9° (MeOH,c=1.00,23°C)

m.p.94.0-96.0°C

No.2a-131

[α]_D²⁰=+60.2° (MeOH,c=0.95,21°C).

No.2a-132

[α]_D²⁰=+10.2° (MeOH,c=0.92,21°C).

No.2a-133

[α]_D²⁰=+60.4° (MeOH,c=1.00,21°C).

No.2a-134

[α]_D²⁰=+88.5° (MeOH,c=1.01,23°C).

No.2a-135

[α]_D²⁰=+52.5° (MeOH,c=1.01,23°C).

m.p.180.0-182.0°C

No.2a-136

$[\alpha]_D^{25} = +88.8^\circ$ (MeOH, $c = 1.02, 25^\circ\text{C}$).

m.p. 79.0-80.0°C

No. 2a-137

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.2\text{Hz}$), 1.11 H_2 1.22(2H, t, $J = 6.9\text{Hz}$), 1.52-2.44(14H, m), 4.09(2H, q, $J = 6.9\text{Hz}$), 4.28(1H, m), 5.28-5.50(2H, m), 6.19(1H, d, $J = 8.7\text{Hz}$), 6.88-7.00(5H, m), 7.65-7.68(2H, m).

IR(CHCl₃): 3485, 3031, 3024, 3014, 2928, 2925, 2870, 1741, 1708, 1649, 1602, 1531, 1504, 1490 /cm.

$[\alpha]_D^{25} = +82.0^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-138

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.2\text{Hz}$), 1.11 H_2 1.22(2H, t, $J = 6.9\text{Hz}$), 1.55(6H, d, $J = 6.0\text{Hz}$), 1.53-2.46(14H, m), 4.25(1H, m), 4.51(1H, m), 5.28-5.50(2H, m), 6.12(1H, d, $J = 9.0\text{Hz}$), 6.97-6.99(5H, m), 7.65-7.68(2H, m).

IR(CHCl₃): 3454, 3031, 3014, 2980, 2925, 2870, 1741, 1708, 1649, 1602, 1522, 1490 /cm.

$[\alpha]_D^{25} = +50.0^\circ$ (MeOH, $c = 1.05, 25^\circ\text{C}$).

No. 2a-139

CDCl_3 , 300MHz

1.00(1H, d, $J = 10.2\text{Hz}$), 1.18 H_2 1.24(2H, t, $J = 6.9\text{Hz}$), 1.59-2.52(14H, m), 4.31(1H, m), 5.40-5.53(2H, m), 6.86(1H, d, $J = 6.7\text{Hz}$), 6.70(1H, d, $J = 1.5\text{Hz}$), 7.12(1H, m), 7.80(1H, m), 7.47(1H, dd, $J = 0.6$ H_2 8.1Hz), 7.61(1H, d, $J = 8.4\text{Hz}$).

IR(CHCl₃): 3449, 3243, 3029, 3022, 3013, 2925, 2871, 1707, 1631, 1542, 1505 /cm.

$[\alpha]_D^{25} = +68.4^\circ$ (MeOH, $c = 1.00, 25^\circ\text{C}$).

m.p. 178.0-179.0°C

No. 2a-140

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.2\text{Hz}$), 1.18 H_2 1.23(2H, t, $J = 6.9\text{Hz}$), 1.57-2.50(14H, m), 4.35(1H, m), 5.32-5.55(2H, m), 6.42(1H, d, $J = 6.7\text{Hz}$), 6.70(1H, d, $J = 1.5\text{Hz}$), 7.21-7.34(2H, m), 7.46(1H, m), 7.76(1H, m), 7.88(1H, d, $J = 3.0\text{Hz}$), 10.20(1H, s).

IR(CHCl₃): 3465, 3010, 2924, 1739, 1604, 1546, 1504 /cm.

$[\alpha]_D^{25} = +39.4^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

m.p. 167.0-168.0°C

No. 2a-141

CDCl_3 , 300MHz

0.99(1H, d, $J = 10.2\text{Hz}$), 1.14 H_2 1.24(2H, t, $J = 6.9\text{Hz}$), 1.55-2.44(14H, m), 3.84(3H, s), 4.27(1H, m), 5.84-5.52(2H, m), 6.28(1H, d, $J = 9.0\text{Hz}$), 6.91 H_2 7.47(2H, t, $J = 9.0\text{Hz}$), 6.98 H_2 7.14(2H, t, $J = 16.5\text{Hz}$), 7.54 H_2 7.70(2H, t, $J = 6.7\text{Hz}$).

IR(CHCl₃): 3453, 3025, 3015, 2925, 2870, 2839, 1740, 1708, 1649, 1602, 1510, 1492, 1470 /cm.

$[\alpha]_D^{25} = +78.4^\circ$ (MeOH, $c = 1.02, 25^\circ\text{C}$).

m.p. 155.0-157.0°C

No. 2a-142

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.2\text{Hz}$), 1.11 H_2 1.23(2H, t, $J = 6.9\text{Hz}$), 1.52-2.45(14H, m), 3.79(3H, s), 4.27(1H, m), 5.84-5.50(2H, m), 6.34(1H, d, $J = 9.0\text{Hz}$), 6.49 H_2 6.62(2H, t, $J = 12.3\text{Hz}$), 6.77 H_2 7.16(2H, t, $J = 6.7\text{Hz}$), 7.32 H_2 7.59(2H, t, $J = 8.1\text{Hz}$).

IR(CHCl₃): 3453, 3025, 3014, 2925, 2870, 2839, 1739, 1708, 1649, 1606, 1510, 1494 /cm.

$[\alpha]_D^{25} = +60.7^\circ$ (MeOH, c=0.99, 25°C).

No. 2a-143

$[\alpha]_D^{25} = +57.5^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-144

$[\alpha]_D^{25} = +12.2^\circ$ (MeOH, c=1.00, 25°C).

m.p. 114.0-116.0°C

No. 2a-145

CDCl₃, 300MHz

0.95(1H, d, J=10.3Hz), 1.10 (s) 1.21(2H, s), 1.53-2.44(14H, m), 4.2
5(1H, m), 5.33-5.49(2H, m), 6.37(1H, d, J=8.7Hz), 7.45-7.47(3H, m), 7.62-7.66(2H,
m), 7.69 (s) 7.80(2H, s), 7.84(2H, s).

IR(CHCl₃): 3449, 3058, 3027, 3012, 2925, 2870, 1708, 1655, 1513, 1481, 1048 /cm.

$[\alpha]_D^{25} = +61.0^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-146

CDCl₃, 300MHz

0.95(1H, d, J=10.5Hz), 1.09 (s) 1.21(2H, s), 1.50-2.41(14H, m), 4.2
5(1H, m), 5.33-5.49(2H, m), 6.33(1H, d, J=8.4Hz), 7.49-7.51(3H, m), 7.91-7.92(2H,
m), 7.82 (s) 7.97(2H, s), 7.99(2H, s).

IR(CHCl₃): 3447, 3029, 3023, 3015, 2925, 2870, 1708, 1660, 1514, 1484, 1321, 1161
/cm.

$[\alpha]_D^{25} = +62.0^\circ$ (MeOH, c=1.00, 25°C).

No. 2a-147

CDCl₃, 300MHz

0.97(1H, d, J=10.3Hz), 1.12 (s) 1.23(2H, s), 1.53-2.46(14H, m), 2.5

1(3H, s), 4.28(1H, m), 5.84-5.81(2H, m), 6.33(1H, d, J=8.4Hz), 7.26 (s) 7.64

(2H, s), 7.64(2H, s), 7.64(2H, s).

IR(CHCl₃): 3458, 3027, 3015, 2925, 2870, 2885, 1708, 1645, 1596, 1516, 1484 /cm.

$[\alpha]_D^{25} = +67.7^\circ$ (MeOH, c=0.82, 25°C).

No. 2a-148

$[\alpha]_D^{25} = +72.5^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-149

$[\alpha]_D^{25} = +67.8^\circ$ (MeOH, c=0.98, 25°C).

No. 2a-150

CDCl₃, 300MHz

0.94(1H, d, J=10.3Hz), 1.10 (s) 1.23(2H, s), 1.53-2.50(14H, m), 4.2
2(1H, m), 5.36-5.55(2H, m), 6.48(1H, d, J=8.4Hz), 8.25(1H, s), 8.90(1H, s).

IR(CHCl₃): 3443, 3374, 3091, 3024, 3012, 2925, 2871, 1709, 1652, 1525, 1494 /cm.

$[\alpha]_D^{25} = +58.1^\circ$ (MeOH, c=1.01, 25°C).

m.p. 120.0-122.0°C

No. 2a-151

$[\alpha]_D^{25} = +40.6^\circ$ (MeOH, c=1.01, 25°C).

No. 2a-152

CDCl₃, 300MHz

0.96(1H, d, J=10.5Hz), 1.10 (s) 1.24(2H, s), 1.50-2.50(14H, m), 2.7
1(3H, s), 4.26(1H, m), 6.37-6.51(2H, m), 6.02(1H, d, J=9.0Hz), 8.78(1H, s).

IR(CHCl₃): 3465, 3455, 3087, 3025, 3014, 2925, 2870, 1708, 1649, 1525, 1503 /cm.

$[\alpha]_D^{25} = +54.1^\circ$ (MeOH, c=1.02, 25°C).

- No.2a-153
CDCl₃, 300MHz
0.95(1H,d,J=9.9Hz),1.11 ㉞ 1.22(㉞㉞ 3H,㉞㉞ a),1.50-2.50(14H,m),2.50(3H,s),4.28(1H,m),5.28-5.51(2H,m),6.01(1H,d,J=8.4Hz),6.89(1H,d,J=5.1Hz),7.26(1H,d,J=5.1Hz).
IR(CHCl₃):3469,3431,3025,3012,2925,2871,2664,1708,1659,1544,1505 /cm.
[α]_D²⁰=+35.8° (MeOH,c=1.02,22°C).
- No.2a-154
CDCl₃, 300MHz
0.95(1H,d,J=9.9Hz),1.10 ㉞ 1.22(㉞㉞ 3H,㉞㉞ a),1.52-2.46(14H,m),2.51(3H,d,J=1.2Hz),4.26(1H,m),5.24-5.50(2H,m),6.00(1H,d,J=8.4Hz),6.72(1H,dd,J=5.1 ㉞ 5.6Hz),7.29(1H,d,J=5.6Hz).
IR(CHCl₃):3450,3431,3026,3011,2925,2889,1739,1708,1659,1547,1506 /cm.
[α]_D²⁰=+50.5° (MeOH,c=1.01,22°C).
- No.2a-155
CDCl₃, 300MHz
0.99(1H,d,J=10.2Hz),1.19 ㉞ 1.25(㉞㉞ 3H,㉞㉞ a),1.53-2.48(14H,m),4.31(1H,m),5.26-5.51(2H,m),6.79(1H,d,J=9.9Hz),7.29(1H,m),7.41(1H,m),7.48(1H,s),7.51(1H,m),7.64(1H,d,J=5.1Hz).
IR(CHCl₃):3436,3029,3024,3015,2925,2871,2670,1708,1659,1598,1510 /cm.
[α]_D²⁰=+69.1° (MeOH,c=1.01,22°C).
- No.2a-156
CDCl₃:CD₂O_D=10:1 300MHz
0.99(1H,d,J=9.9Hz),1.11 ㉞ 1.21(㉞㉞ 3H,㉞㉞ a),1.56-2.58(14H,m),4.22(1H,m),5.25-5.69(2H,m),6.88(1H,d,J=8.4Hz),7.48(1H,d,J=8.4Hz),7.61(1H,dd,J=1.5 ㉞ 8.4Hz),8.09(1H,d,J=1.5Hz),8.12(1H,s).
IR(KBr):3422,3115,2985,2925,2869,2809,1708,1636,1578,1529,1470 /cm.
[α]_D²⁰=+62.8° (MeOH,c=1.01,22°C).
- No.2a-157
5 [α]_D²⁰=+40.0° (MeOH,c=0.95,22°C).
- No.2a-158
CDCl₃, 300MHz
1.00(1H,d,J=10.5Hz),1.17 ㉞ 1.24(㉞㉞ 3H,㉞㉞ a),1.54-2.50(14H,m),4.34(1H,m),5.26-5.52(2H,m),7.80(1H,d,J=9.0Hz),9.30(1H,s).
IR(CHCl₃):3410,3122,3030,3012,2925,2871,2668,1709,1667,1528,1466 /cm.
[α]_D²⁰=+44.9° (MeOH,c=0.99,22°C).
- No.2a-159
15 CDCl₃, 300MHz
0.97(1H,d,J=10.2Hz),1.13 ㉞ 1.22(㉞㉞ 3H,㉞㉞ a),1.55-2.49(14H,m),3.03(6H,s),4.23(1H,m),5.22-5.51(2H,m),6.16(1H,d,J=8.7Hz),6.57 ㉞ 7.63(㉞㉞ 2H,㉞㉞ d,J=9.7Hz).
IR(CHCl₃):3457,3028,3008,2924,2870,2654,1739,1708,1637,1606,1606,1584,1501 /cm.
[α]_D²⁰=+84.8° (MeOH,c=1.01,22°C).
- No.2a-160
25 d₆-DMSO 300MHz
0.83(1H,d,J=9.9Hz),1.02 ㉞ 1.19(㉞㉞ 3H,㉞㉞ a),1.53-1.61(8H,m),1.90-2.32(11H,m),3.90(1H,m),5.41-5.44(2H,m),7.22(1H,dd,J=0.9 ㉞ 7.2Hz),7.45-7.60(2H,m),7.77(1H,dd,J=0.9 ㉞ 7.2Hz),8.03(1H,d,J=6.9Hz),12.40(1H,s).
IR(㉞㉞):3315,2924,2858,2855,2525,1737,1703,1637,1598,1531,1541 /cm.
[α]_D²⁰=+78.5° (MeOH,c=1.01,24°C).

m.p.161.0-162.0°C

No.2a-161

$[\alpha]_D^{25} = +65.8^\circ$ (MeOH, c=1.00, 22°C).

No.2a-162

CDCl₃, 800MHz

0.99(1H, d, J=10.3Hz), 1.18 W 1.25(각각 3H, 각각 a), 1.53-2.45(14H, m), 4.3
0(1H, m), 5.36-5.51(2H, m), 6.32(1H, d, J=8.4Hz), 7.88 W 8.28(각각 2H, 각각
d, J=9.0Hz).

IR(CHCl₃): 3448, 3029, 3016, 2925, 2870, 1708, 1664, 1602, 1527, 1484, 1347 /cm.

$[\alpha]_D^{25} = +72.7^\circ$ (MeOH, c=1.02, 22°C).

No.2a-168

CDCl₃, 800MHz

0.96(1H, d, J=10.2Hz), 1.11 W 1.33(각각 3H, 각각 a), 1.55-2.61(14H, m), 4.3
6(1H, m), 5.35-5.57(2H, m), 6.63(1H, d, J=7.8Hz), 7.41(1H, dd, J=4.8 W 8.1Hz),
8.20(1H, d, J=8.1Hz), 8.65(1H, d, J=4.8Hz), 9.00(1H, s).

IR(CHCl₃): 3448, 3026, 3018, 2925, 2870, 2584, 1709, 1658, 1590, 1515, 1471 /cm.

$[\alpha]_D^{25} = +71.8^\circ$ (MeOH, c=1.01, 22°C).

No.2a-164

$[\alpha]_D^{25} = +40.8^\circ$ (MeOH, c=0.98, 22°C).

No.2a-165

CDCl₃, 800MHz

0.98(1H, d, J=10.5Hz), 1.11 W 1.24(각각 3H, 각각 a), 1.55-2.52(14H, m), 4.2
4(1H, m), 5.37-5.57(2H, m), 6.65(1H, d, J=7.8Hz), 7.59 W 8.53(각각 2H
각각 d, J=6.0Hz).

IR(CHCl₃): 3447, 3346, 3028, 3016, 2925, 2870, 2538, 1941, 1708, 1662, 1556, 1516
/cm.

$[\alpha]_D^{25} = +75.4^\circ$ (MeOH, c=1.01, 22°C).

No.2a-166

CDCl₃, 800MHz

0.97(1H, d, J=10.2Hz), 1.11 W 1.22(각각 3H, 각각 a), 1.51-2.44(14H, m), 2.9
6(6H, s), 4.25(1H, m), 5.33-5.50(2H, m), 6.19(1H, d, J=8.7Hz), 6.77 W 6.97
(각각 2H, 각각 d, J=8.4Hz), 8.94 W 7.65(각각 2H, 각각 d, J=9.0Hz).

IR(CHCl₃): 3453, 3024, 3016, 2924, 2871, 2806, 1789, 1708, 1647, 1612, 1604, 1515,
1490 /cm.

$[\alpha]_D^{25} = +53.1^\circ$ (MeOH, c=1.02, 22°C).

m.p.104.0-105.5°C

No.2a-167

CDCl₃, 800MHz

1.01(1H, d, J=9.9Hz), 1.19 W 1.26(각각 3H, 각각 a), 1.56-2.53(14H, m), 4.37(
1H, m), 5.35-5.55(2H, m), 6.47(1H, d, J=8.4Hz), 7.61-7.71(2H, m), 7.79(2H, s), 7.69
-7.97(2H, m), 8.27(1H, d, J=2.1Hz), 8.66-8.73(2H, m).

IR(CHCl₃): 3460, 3024, 3014, 2925, 2870, 2667, 1707, 1650, 1631, 1609 /cm.

$[\alpha]_D^{25} = +70.5^\circ$ (MeOH, c=1.00, 22°C).

No.2a-168

CDCl₃, 800MHz

1.02(1H, d, J=10.2Hz), 1.30 W 1.26(각각 3H, 각각 a), 1.56-2.50(14H, m), 4.3
8(1H, m), 5.36-5.56(2H, m), 6.51(1H, d, J=8.4Hz), 7.61-7.93(7H, m), 8.74(1H, d, J=
8.4Hz), 9.15(1H, s).

IR(CHCl₃): 3517, 3451, 3060, 3028, 3011, 2925, 2870, 2664, 1709, 1651, 1619, 1498/
cm.

$[\alpha]_D^{25} = +54.4^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-169

CDCl_3 , 300MHz

0.96(1H, d, $J=10.5\text{Hz}$), 1.09 (s) 1.21(2H, s, s), 1.50-2.44(14H, m), 2.8
5(3H, s), 4.24(1H, m), 5.22-5.45(2H, m), 6.19(1H, d, $J=8.4\text{Hz}$), 6.94 (s) 7.45 (s)
2H, s, s, d, $J=9.0\text{Hz}$), 7.11 (s) 7.45(2H, s, s, d, $J=8.7\text{Hz}$).

IR(CHCl₃): 3516, 3452, 3029, 3009, 2925, 2870, 2840, 2825, 1708, 1650, 1593, 1515,
1493, 1482 /cm.

$[\alpha]_D^{25} = +57.8^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-170

CDCl_3 , 300MHz

0.98(1H, d, $J=10.2\text{Hz}$), 1.15 (s) 1.24(2H, s, s), 1.52-2.50(14H, m), 4.2
8(1H, m), 5.38-5.54(2H, m), 6.25(1H, d, $J=8.2\text{Hz}$), 7.38-7.44(2H, m), 7.74(1H, s), 7.
81-7.86(2H, m).

IR(CHCl₃): 3517, 3448, 3427, 3024, 3013, 2925, 2870, 2869, 1708, 1650, 1582, 1525,
1500 /cm.

$[\alpha]_D^{25} = +51.6^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-171

CDCl_3 , 300MHz

0.96(1H, d, $J=10.2\text{Hz}$), 1.11 (s) 1.22(2H, s, s), 1.52-2.42(14H, m), 2.48
(3H, s), 4.21(1H, m), 5.31-5.52(2H, m), 6.06(1H, d, $J=8.2\text{Hz}$), 6.97 (s) 7.59 (s)
2H, s, s, d, $J=1.2\text{Hz}$).

IR(CHCl₃): 3462, 3113, 3028, 3007, 2925, 2870, 2869, 1708, 1645, 1554, 1509 /cm.

$[\alpha]_D^{25} = +52.4^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-172

CDCl_3 , 300MHz

0.96(1H, d, $J=10.2\text{Hz}$), 1.09 (s) 1.22(2H, s, s), 1.50-2.40(14H, m), 2.6
9(3H, s), 4.24(1H, m), 5.35-5.51(2H, m), 5.98(1H, d, $J=8.7\text{Hz}$), 7.03 (s) 7.07 (s)
2H, s, s, d, $J=5.4\text{Hz}$).

IR(CHCl₃): 3451, 3031, 3013, 2925, 2870, 2866, 1708, 1647, 1542, 1497 /cm.

$[\alpha]_D^{25} = +51.2^\circ$ (MeOH, $c=1.00, 25^\circ\text{C}$).

No. 2a-173

CDCl_3 , 300MHz

0.95(1H, d, $J=10.2\text{Hz}$), 1.10 (s) 1.22(2H, s, s), 1.50-2.45(14H, m), 4.3
2(1H, m), 5.35-5.49(2H, m), 6.05(1H, d, $J=8.4\text{Hz}$), 7.28 (s) 7.75(2H, s, s, d, $J=1.5\text{Hz}$).

IR(CHCl₃): 3451, 3011, 3029, 3011, 2925, 2870, 1708, 1652, 1523, 1500 /cm.

$[\alpha]_D^{25} = +50.6^\circ$ (MeOH, $c=1.01, 25^\circ\text{C}$).

No. 2a-174

CDCl_3 , 300MHz

0.98(1H, d, $J=10.2\text{Hz}$), 1.12 (s) 1.22(2H, s, s), 1.52-2.50(14H, m), 4.2
9(1H, m), 5.35-5.51(2H, m), 7.02(1H, d, $J=8.4\text{Hz}$), 7.82 (s) 8.16(2H, s, s, d, $J=3.8\text{Hz}$).

IR(CHCl₃): 3417, 3115, 3023, 3014, 2925, 2870, 1708, 1645, 1530 /cm.

$[\alpha]_D^{25} = +48.8^\circ$ (MeOH, $c=1.02, 25^\circ\text{C}$).

No. 2a-175

CDCl_3 , 300MHz

0.97(1H, d, $J=10.2\text{Hz}$), 1.14 (s) 1.22(2H, s, s), 1.50-2.52(14H, m), 2.5
2(3H, s), 4.29(1H, m), 5.24-5.51(2H, m), 7.78(1H, d, $J=9.0\text{Hz}$), 7.24 (s) 7.52 (s)
2H, s, s, d, $J=5.4\text{Hz}$).

IR(CHCl₃): 3229, 3093, 3023, 3015, 2924, 2871, 1708, 1640, 1528 /cm.

$[\alpha]_D^{25} = +45.0^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-176

CDCl_3 , 300MHz

0.96(1H, d, $J = 10.5\text{Hz}$), 1.09 W 1.23(작작 3H, 작작 a), 1.52-2.48(14H, m), 2.4
0(3H, d, $J = 0.9\text{Hz}$), 4.24(1H, m), 5.35-5.51(2H, m), 6.05(1H, d, $J = 8.7\text{Hz}$), 6.95(1H,
m), 7.57(1H, d, $J = 8.5\text{Hz}$).

IR(CHCl₃): 3517, 3444, 3103, 3034, 3013, 2926, 2870, 1789, 1708, 1649, 1636, 1507/
cm.

$[\alpha]_D^{25} = +54.5^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

m.p. 97.0-99.0°C

No. 2a-177

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.3\text{Hz}$), 1.11 W 1.23(작작 3H, 작작 a), 1.52-2.45(14H, m), 3.9
3(3H, s), 4.37(1H, m), 5.34-5.50(2H, m), 6.35(1H, d, $J = 8.5\text{Hz}$), 7.50(1H, d, $J = 8.7\text{Hz}$),
8.10(1H, d, $J = 8.3\text{Hz}$).

IR(CHCl₃): 3395, 3121, 3031, 3019, 3013, 2925, 2871, 1729, 1709, 1640, 1557, 1533
/cm.

$[\alpha]_D^{25} = +22.5^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

m.p. 109.0-112.0°C

No. 2a-178

CDCl_3 , 300MHz

0.96(1H, d, $J = 10.5\text{Hz}$), 1.10 W 1.23(작작 3H, 작작 a), 1.51-2.45(14H, m), 4.2
4(1H, m), 5.55-5.50(2H, m), 6.09(1H, d, $J = 8.4\text{Hz}$), 7.17-7.31(5H, m), 7.95(1H, d, $J =$
1.5Hz).

IR(CHCl₃): 3510, 3451, 3062, 3031, 3023, 3011, 2925, 2870, 2682, 1708, 1651, 1582,
1555, 1497, 1477/cm.

$[\alpha]_D^{25} = +47.9^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-179

CDCl_3 , 300MHz

0.96(1H, d, $J = 10.3\text{Hz}$), 1.14 W 1.24(작작 3H, 작작 a), 1.52-2.48(14H, m), 4.3
0(1H, m), 5.36-5.52(2H, m), 6.73(1H, d, $J = 9.0\text{Hz}$), 6.26 W 7.37(작작 1H, 작작
d, $J = 6.0\text{Hz}$).

IR(CHCl₃): 3509, 3429, 3115, 3094, 3025, 3014, 2925, 2871, 2666, 1708, 1649, 1529,
1510 /cm.

$[\alpha]_D^{25} = +51.0^\circ$ (MeOH, $c = 1.02, 25^\circ\text{C}$).

No. 2a-180

CDCl_3 , 300MHz

0.95(1H, d, $J = 10.2\text{Hz}$), 1.14 W 1.24(작작 3H, 작작 a), 1.52-2.48(14H, m), 3.8
9(3H, s), 4.21(1H, m), 5.55-5.50(2H, m), 6.05(1H, d, $J = 8.4\text{Hz}$), 6.46 W 7.04 (작작 1H, 작작
d, $J = 1.8\text{Hz}$).

IR(CHCl₃): 3516, 3450, 3114, 3031, 3010, 2925, 2871, 1708, 1646, 1546, 1511, 1477
/cm.

$[\alpha]_D^{25} = +49.1^\circ$ (MeOH, $c = 1.01, 25^\circ\text{C}$).

No. 2a-181

CDCl_3 , 300MHz

0.97(1H, d, $J = 10.2\text{Hz}$), 1.14 W 1.23(작작 3H, 작작 a), 1.52-2.48(14H, m), 2.4
3(3H, s), 4.31(1H, m), 5.34-5.52(2H, m), 6.07(1H, d, $J = 8.3\text{Hz}$), 7.37 W 8.17 (작작 1H, 작작
d, $J = 3.3\text{Hz}$).

IR(CHCl₃): 3510, 3301, 3112, 3023, 3007, 2924, 2871, 2682, 1708, 1655, 1584 /cm.

$[\alpha]_D^{25} = +41.0^\circ$ (MeOH, $c = 0.96, 25^\circ\text{C}$).

No. 2a-182

CDCl₃, 800MHz

0.96(1H, d, J=10.2Hz), 1.11 W 1.22(2H, 2H, 2H, 2H, 2H, 2H), 1.53-2.48(14H, m), 2.5
1(2H, s), 4.31(1H, m), 5.35-5.51(2H, m), 6.05(1H, d, J=8.1Hz), 7.28 W 7.78 (2H, 2H, 2H, 2H, 2H, 2H),
2(1H, 2H, 2H, 2H, 2H, 2H).

IR(CHCl₃): 2809, 2450, 3106, 3024, 3012, 2925, 2870, 2666, 1708, 1650, 1535, 1492, 1471 /cm.

[α]_D²⁰ = +52.9° (MeOH, c=0.96, 25°C).

No. 2a-183

CDCl₃, 800MHz

0.96(1H, d, J=10.5Hz), 1.12 W 1.22(2H, 2H, 2H, 2H, 2H, 2H), 1.53-2.48(14H, m), 4.2
5(1H, m), 5.35-5.51(2H, m), 5.17(1H, d, J=8.7Hz), 7.01-7.05(2H, m), 7.14 W 7.6
2(2H, 2H, 2H, 2H, 2H, 2H), 7.27-7.34(2H, m).

IR(CHCl₃): 2428, 3026, 3015, 2925, 2870, 2666, 1739, 1708, 1642, 1512, 1494, 1428,
1499 /cm.

[α]_D²⁰ = +64.5° (MeOH, c=1.02, 23°C).

No. 2a-184

CDCl₃, 800MHz

1.01(1H, d, J=10.2Hz), 1.18 W 1.25(2H, 2H, 2H, 2H, 2H, 2H), 1.55-2.50(14H, m), 4.3
5(1H, m), 5.35-5.55(2H, m), 5.42(1H, d, J=8.7Hz), 7.46-7.53(2H, m), 7.73(1H, dd, J
=1.8 W 8.4Hz), 7.82-7.89(2H, m), 8.31(1H, m), 8.59(1H, d, J=1.5Hz).

IR(CHCl₃): 2451, 3031, 3014, 2925, 2870, 2660, 1739, 1708, 1650, 1604, 1512, 1488
/cm.

[α]_D²⁰ = +58.5° (MeOH, c=1.00, 23°C).

No. 2a-185

CDCl₃, 800MHz

1.00(1H, d, J=10.2Hz), 1.18 W 1.25(2H, 2H, 2H, 2H, 2H, 2H), 1.55-2.50(14H, m), 4.3

4(1H, m), 5.35-5.54(2H, m), 5.35(1H, d, J=8.7Hz), 7.37(1H, t, J=7.4Hz), 7.50(1H, m
, 7.57-7.59(2H, m), 7.79(1H, dd, J=1.8 W 8.1Hz), 7.99(1H, d, J=7.8Hz), 8.39(1
H, d, J=1.8Hz).

IR(CHCl₃): 2451, 3030, 3020, 2920, 2870, 2665, 1708, 1652, 1622, 1603, 1538, 1514, 1469,
1448 /cm.

[α]_D²⁰ = +59.4° (MeOH, c=1.01, 24°C).

No. 2a-186

CDCl₃, 800MHz

1.00(1H, d, J=10.5Hz), 1.17 W 1.25(2H, 2H, 2H, 2H, 2H, 2H), 1.54-2.50(14H, m), 4.3
3(1H, m), 5.35-5.54(2H, m), 6.37(1H, d, J=8.7Hz), 7.37(1H, t, J=7.4Hz), 7.51(1H, t,
J=7.8Hz), 7.56(1H, m), 7.70(1H, dd, J=1.8 W 8.4Hz), 7.97(2H, m).

IR(CHCl₃): 2451, 3030, 3014, 2924, 2870, 2671, 1739, 1708, 1652, 1577, 1517, 1458,
1471 /cm.

[α]_D²⁰ = +72.2° (MeOH, c=1.00, 24°C).

No. 2a-187

CDCl₃, 800MHz

1.00(1H, d, J=9.8Hz), 1.16 W 1.25(2H, 2H, 2H, 2H, 2H, 2H), 1.54-2.53(14H, m), 4.07(2H, s),
4.37(1H, m), 5.30-5.54(2H, m), 7.34(1H, m), 7.47(1H, s), 7.47-7.60(2H, m), 7.
93(1H, d, J=7.8Hz), 8.43(1H, s), 8.49(1H, d, J=9.0Hz).

IR(CHCl₃): 3397, 3074, 3027, 3020, 3009, 2924, 1738, 1708, 1647, 1633, 1584, 1465,
1452 /cm.

[α]_D²⁰ = +42.7° (MeOH, c=1.01, 25°C).

No. 2a-188

CDCl₃, 800MHz

0.97(1H, d, J=10.2Hz), 1.11 W 1.22(2H, 2H, 2H, 2H, 2H, 2H), 1.53-2.50(14H, m), 4.2
3(1H, m), 5.37-5.50(2H, m), 6.10(1H, d, J=9.0Hz), 6.20(1H, m), 6.51(1H, m), 6.97(1

H_m), 10.81(1H, brs).
IR(CHCl₃): 8450, 8286, 8112, 8029, 8015, 2925, 2871, 2645, 1701, 1616, 1558, 1516 /cm.
[α]_D²⁰ = +50.6° (MeOH, c = 1.01, 24°C).

No. 2a-189

CDCl₃, 800MHz
0.94(1H, d, J = 9.8Hz), 1.11 ㉞ 1.22(각각 3H, 각각 a), 1.50-2.46(14H, m), 3.98(3H, s), 4.18(1H, m), 5.35-5.52(2H, m), 6.09(1H, d, J = 9.8Hz), 6.09(1H, m), 6.48(1H, m), 6.78(1H, m).
IR(CHCl₃): 8452, 8102, 8028, 8007, 2925, 2871, 2666, 1739, 1708, 1650, 1586, 1499, 1471 /cm.
[α]_D²⁰ = +49.8° (MeOH, c = 1.01, 23°C).
m.p. 101.5-103.5°C

No. 2a-190

CDCl₃, 800MHz
0.94(1H, d, J = 9.8Hz), 1.11 ㉞ 1.21(각각 3H, 각각 a), 1.54-2.47(14H, m), 4.23(1H, m), 5.38-5.52(2H, m), 6.06(1H, d, J = 9.0Hz), 6.84(1H, m), 6.75(1H, m), 6.36(1H, m), 6.71(1H, brs).
IR(CHCl₃): 8470, 8215, 8030, 8020, 8010, 2925, 2871, 2664, 1709, 1612, 1564, 1510 /cm.
[α]_D²⁰ = +43.8° (MeOH, c = 1.01, 24°C).

No. 2a-191

CDCl₃, 800MHz
0.96(1H, d, J = 10.2Hz), 1.11 ㉞ 1.22(각각 3H, 각각 a), 1.55-2.44(14H, m), 3.68(3H, s), 4.30(1H, m), 5.35-5.51(2H, m), 5.93(1H, d, J = 8.4Hz), 6.27(1H, dd, J = 1.3 ㉞ 2.7Hz), 6.56(1H, t, J = 2.7Hz), 7.19(1H, t, J = 1.5Hz).
IR(CHCl₃): 8452, 8091, 8018, 8006, 2925, 2871, 2662, 1736, 1710, 1634, 1609, 1556, 1498 /cm.
[α]_D²⁰ = +43.1° (MeOH, c = 1.01, 23°C).

No. 2a-192

CDCl₃, 800MHz
0.96(1H, d, J = 10.5Hz), 1.11 ㉞ 1.21(각각 3H, 각각 a), 1.48(3H, t, J = 7.5Hz), 1.54-2.44(14H, m), 3.98(2H, q, J = 7.5Hz), 4.21(1H, m), 5.39-5.51(2H, m), 5.94(1H, d, J = 8.4Hz), 6.27(1H, dd, J = 1.3 ㉞ 2.7Hz), 6.63(1H, t, J = 2.7Hz), 7.36(1H, t, J = 1.5Hz).
IR(CHCl₃): 8630, 8452, 8032, 8018, 8006, 2925, 2871, 2661, 1725, 1710, 1633, 1610, 1555, 1497 /cm.
[α]_D²⁰ = +40.1° (MeOH, c = 1.00, 23°C).

No. 2a-193

CDCl₃, 800MHz
0.98(1H, d, J = 10.2Hz), 1.10 ㉞ 1.22(각각 3H, 각각 a), 1.53-2.49(14H, m), 2.58(3H, s), 4.21(1H, m), 5.35-5.54(2H, m), 6.15(1H, d, J = 8.1Hz), 6.52(1H, dd, J = 1.3 ㉞ 3.6Hz), 7.29(1H, t, J = 3.6Hz), 7.94(1H, t, J = 1.5Hz).
IR(CHCl₃): 8516, 8450, 8410, 8152, 8027, 8015, 2925, 2871, 2670, 1732, 1648, 1574, 1509 /cm.
[α]_D²⁰ = +45.0° (MeOH, c = 1.01, 25°C).

No. 2a-194

CDCl₃, 800MHz
0.99(1H, d, J = 10.2Hz), 1.11 ㉞ 1.24(각각 3H, 각각 a), 1.52-2.53(14H, m), 4.34(1H, m), 5.23-5.57(2H, m), 6.21(1H, d, J = 8.6Hz), 7.35-7.50(2H, m), 7.23(1H, s), 7.88(1H, m), 8.31(1H, m).
IR(CHCl₃): 8443, 8067, 8018, 2925, 2870, 2665, 1708, 1651, 1515, 1493 /cm.

$[\alpha]_D^{25} = +55.7^\circ$ (MeOH, c=1.01, 23°C).

No. 2a-195

CDCl₃, 300MHz

1.01(1H, d, J=10.0Hz), 1.08 1.23(2H, d, J=10.0Hz), 1.50-2.64(14H, m), 2.68(2H, s), 4.40(1H, m), 5.36-5.81 (H, m), 6.02(1H, d, J=9.4Hz), 7.80-7.42(2H, m), 7.73-7.86(2H, m).

IR(CHCl₃): 3510, 3434, 3082, 3029, 3014, 2924, 2871, 2869, 1708, 1650, 1583, 1539, 1500 /cm.

$[\alpha]_D^{25} = +72.4^\circ$ (MeOH, c=1.00, 23°C).

m.p. 111.0-112.0°C

No. 2a-196

CDCl₃, 300MHz

0.42 1.04(2H, d, J=10.0Hz), 1.11-2.48(14H, m), 2.24(2H, s), 4.02(1H, m), 5.23-5.44(2H, m), 5.58(1H, d, J=8.8Hz), 7.27-7.21(2H, m), 7.42-7.48(2H, m), 7.93(1H, s).

IR(CHCl₃): 3419, 3114, 3025, 3006, 2924, 2871, 2862, 1737, 1709, 1638, 1540, 1519 /cm.

$[\alpha]_D^{25} = +48.7^\circ$ (MeOH, c=1.01, 23°C).

No. 2a-197

CDCl₃, 300MHz

0.95(1H, d, J=10.0Hz), 1.09 1.23(2H, d, J=10.0Hz), 1.54-2.46(15H, m), 2.77(4H, brs), 4.21(1H, m), 5.32-5.54(2H, m), 6.02(1H, d, J=8.6Hz), 7.43(1H, s).

IR(CHCl₃): 3445, 3101, 3024, 3014, 2928, 2865, 2861, 1739, 1708, 1648, 1550, 1507 /cm.

$[\alpha]_D^{25} = +51.9^\circ$ (MeOH, c=1.01, 23°C).

No. 2a-198

CDCl₃, 300MHz

0.95(1H, d, J=10.2Hz), 1.11 1.23(2H, d, J=10.2Hz), 1.50-2.44(14H, m), 4.24(1H, m), 4.42(2H, s), 5.85-5.49(2H, m), 6.25(1H, d, J=8.1Hz), 7.33(1H, m), 7.43(1H, dd, J=1.5 7.5Hz), 7.49(1H, d, J=8.1Hz), 7.80-7.88(1H, m), 7.88(1H, dd, J=1.8 7.8Hz), 8.02(1H, d, J=1.8Hz), 8.19(1H, dd, J=1.5 8.1Hz).

IR(CHCl₃): 3448, 3030, 3012, 2925, 2870, 1739, 1708, 1671, 1588, 1559, 1514, 1472 /cm.

$[\alpha]_D^{25} = +56.9^\circ$ (MeOH, c=1.01, 24°C).

No. 2a-199

CDCl₃, 300MHz

0.96(1H, d, J=10.2Hz), 1.11 1.23(2H, d, J=10.2Hz), 1.51-2.46(14H, m), 2.40(1H, m), 2.76(1H, m), 4.24(1H, m), 5.33-5.51(2H, m), 6.25(1H, m), 7.16(1H, m), 7.24-7.33(2H, m), 7.46(1H, d, J=7.5Hz), 7.52-7.60(2H, m), 7.66(1H, dd, J=1.8 and 4.5Hz).

IR(CHCl₃): 3553, 3447, 3063, 3025, 3018, 2924, 2871, 2862, 1708, 1651, 1600, 1557, 1514, 1471 /cm.

$[\alpha]_D^{25} = +54.8^\circ$ (MeOH, c=1.00, 23°C).

No. 2a-200

CDCl₃, 300MHz

0.96(1H, d, J=10.2Hz), 1.12 1.23(2H, d, J=10.2Hz), 1.51-2.46(14H, m), 4.25(1H, m), 5.34-5.51(2H, m), 6.25(1H, d, J=8.4Hz), 7.02 7.10(2H, d, J=12.8Hz), 7.23-7.33(4H, m), 7.50(1H, m), 7.64(1H, dd, J=1.8 and 7.8Hz), 7.82(1H, d, J=1.8Hz).

IR(CHCl₃): 3450, 3060, 3025, 3014, 2925, 2871, 2862, 1708, 1653, 1596, 1542, 1518, 1478 /cm.

$[\alpha]_D^{25} = +52.5^\circ$ (MeOH, c=1.00, 24°C).

No.2a-201

CDCl₃, 300MHz

0.95(1H,d,J=9.9Hz),1.15 ㉹ 1.22(각각 3H, 각각 a),1.55-2.60(14H,m),4.28(1H,m),5.85-5.88(2H,m),7.14(1H,d,J=9.9Hz),7.34 ㉹ 7.40(각각 1H, 각각 d, J=12.9Hz),7.82-7.78(4H,m),8.25-8.30(2H,m),8.72(1H,d,J=1.5Hz).

IR(CHCl₃):3448,3389,3297,3061,3030,3016,2925 2870,1726,1708 1652,160 8,1521,1483,1472,1309 /cm.

[α]_D²⁰=+61.1° (MeOH,c=1.01,23°C).

No.2a-202

CDCl₃, 300MHz

0.96(1H,d,J=10.2Hz),1.09 ㉹ 1.22(각각 3H, 각각 a),1.52-2.43(14H,m),2.6 3(3H,a),4.25(1H,m),5.32-5.49(2H,m),6.19(1H,d,J=8.4Hz),7.10 ㉹ 7.58 (각각 2H, 각각 d,J=9.0Hz),7.21(1H,m),7.30-7.32(2H,m),7.46(1H,d,J=7.5Hz)

IR(CHCl₃):3511,3459,3062,3022,3014,2925 2870,1739,1708,1650,1595,1556, 1516,1482,1471 /cm.

[α]_D²⁰=+60.2° (MeOH,c=1.01,25°C).

No.2a-203

CDCl₃, 300MHz

0.98(1H,d,J=10.5Hz),1.09 ㉹ 1.23(각각 3H, 각각 a),1.52-2.43(14H,m),4.2 3(1H,m),5.85-5.81(2H,m),6.93(1H,d,J=8.7Hz),8.56(1H,dd,J=0.9 ㉹ 1.8Hz), 7.48(1H,t,J=1.8Hz),7.92(1H,dd,J=0.9 ㉹ 1.8Hz).

IR(CHCl₃):3517,3450,3134,3031,3008,2925,2870,2667,1708,1656,1588,1570, 1514 /cm.

[α]_D²⁰=+46.7° (MeOH,c=0.92,25°C).

No.2b-1

[α]_D²⁰= +25.6° (MeOH,c=1.01,23°C).

No.2b-2

[α]_D²⁰= +88.9° (MeOH,c=1.01,24°C).

No.2c-1

[α]_D²⁰= +80.5° (MeOH,c=1.01,22°C).

No.2c-2

[α]_D²⁰= +55.8° (MeOH,c=0.92,22°C).

No.2c-3

[α]_D²⁰= +54.7° (MeOH,c=1.01,22°C).

No.2d-1

[α]_D²⁰= -6.2° (MeOH,c=1.00,21°C).

No.2d-2

[α]_D²⁰=+15.6° (MeOH,c=0.34,22°C).

No.2d-3

[α]_D²⁰=+81.6° (MeOH,c=1.01,22°C).

No.2e-1

[α]_D²⁰= -9.4° (MeOH,c=1.00,22°C).

No.2e-2

[α]_D²⁰= -1.8° (MeOH,c=1.02,23°C).

No.2e-3

$[\alpha]_D = -6.7^\circ$ (MeOH, $c=1.01, 23^\circ\text{C}$).

No.2f-1

$[\alpha]_D = +8.8^\circ$ (MeOH, $c=1.01, 23^\circ\text{C}$).

No.2f-2

$[\alpha]_D = -2.8^\circ$ (MeOH, $c=1.00, 22^\circ\text{C}$).

No.2f-3

$[\alpha]_D = -2.6^\circ$ (MeOH, $c=1.01, 22^\circ\text{C}$).

No.2g-1

$[\alpha]_D = +54.6^\circ$ (MeOH, $c=1.01, 24^\circ\text{C}$).

No.3a-2

$\text{CDCl}_3, 300\text{MHz}$

0.98-2.18(14H, m), 2.81(2H, t, $J=7.2\text{Hz}$), 2.35-2.40(1H, m), 3.10-3.20(1H, m),
5.00(1H, d, $J=6.9\text{Hz}$), 5.80-5.48(2H, m), 6.75(1H, d, $J=10.2\text{Hz}$), 7.38-7.52(6H, m),
IR(CDCl_3): 2266, 3028, 2954, 2874, 1709, 1620, 1448, 1412, 1318, 1141, 970, 892/ cm^{-1} .

$[\alpha]_D = +20.2 \pm 0.6^\circ$ ($\text{CHCl}_3, c=1.05, 24^\circ\text{C}$).

No.3a-3

$\text{CDCl}_3, 300\text{MHz}$

0.95-2.00(14H, m), 2.20-2.29(2H, m), 3.00-3.06(1H, m), 3.66(2H, m), 5.00(1H, d,
 $J=6.6\text{Hz}$), 5.13-5.29(2H, m), 7.38-7.52(2H, m), 7.59-7.65(2H, m), 7.69-
7.75(2H, m), 7.92-7.98(2H, m).

IR(CHCl_3): 2976, 3018, 2946, 2868, 1727, 1594, 1486, 1395, 1322, 1157, 1095, 890

$/\text{cm}^{-1}$.

$[\alpha]_D = +2.3 \pm 0.4^\circ$ ($\text{CHCl}_3, c=1.02, 23^\circ\text{C}$).

mp. 65-66.5 $^\circ\text{C}$

No.3a-4

$\text{CDCl}_3, 300\text{MHz}$

0.93-2.05(14H, m), 2.15-2.22(1H, m), 2.81(2H, t, $J=7.2\text{Hz}$), 3.01-3.10(1H, m),
5.18-5.31(2H, m), 7.38-7.52(2H, m), 7.58-7.66(2H, m), 7.69-7.76(2H, m), 7.92-
7.98(2H, m)

IR(CHCl_3): 3374, 3260, 3020, 2948, 2868, 1708, 1594, 1479, 1396, 1319, 1156, 1095,
1052, 891/ cm^{-1} .

$[\alpha]_D = +13.1 \pm 0.5^\circ$ ($\text{CHCl}_3, c=1.16, 24^\circ\text{C}$).

No.3a-6

$\text{CD}_2\text{OD}, 300\text{MHz}$

1.04-1.95(14H, m), 2.07(2H, t, $J=7.5\text{Hz}$), 2.14-2.22(1H, m), 2.94-3.00(1H, m),
5.04-5.25(2H, m), 7.38-7.52(2H, m), 7.66-7.71(2H, m), 7.78-7.86(2H, m), 7.91-
7.97(2H, m).

IR(KBr): 3421, 3278, 2951, 2872, 1662, 1481, 1409, 1317, 1156, 1097, 1057, 895/ cm^{-1} .

$[\alpha]_D = -15.3 \pm 0.5^\circ$ ($\text{CHCl}_3, c=1.06, 23^\circ\text{C}$).

mp. 105-112 $^\circ\text{C}$

No.3a-11

$\text{CDCl}_3, 300\text{MHz}$

0.80-2.04(14H, m), 2.05-2.19(1H, m), 2.35(2H, t, $J=7.2\text{Hz}$), 2.95-3.04(1H, m),
5.17-5.32(2H, m), 7.56-7.68(2H, m), 7.83-7.95(2H, m).

IR(CHCl_3): 2260, 3020, 2948, 2868, 1707, 1599, 1486, 1383, 1325, 1268, 1180, 1088,
1058, 1008, 892/ cm^{-1} .

$[\alpha]_D^{25} = +8.3 \pm 0.5^\circ$ (CHCl₃, c=1.00, 22°C).

No. 3a-16

CDCl₃ 300MHz

0.80-1.90(14H,m), 1.98-2.04(1H,m), 2.27(2H,t,J=7.2Hz), 2.88(6H,s), 2.90-2.98(1H,m), 4.88-5.00(2H,m), 5.18(1H,d,J=7.2Hz), 7.18(1H,d,J=7.5Hz), 7.48-7.60(2H,m), 8.26-8.33(2H,m), 8.58(1H,d,J=8.7Hz).

IR(CHCl₃): 3272, 3030, 2948, 2868, 2782, 1708, 1678, 1455, 1407, 1311, 1229, 1160, 1142, 1070, 942, 891/cm.

$[\alpha]_D^{25} = -19.7 \pm 0.6^\circ$ (CHCl₃, c=1.08, 23.5°C).

No. 3a-31

CDCl₃ 300MHz

0.80-1.85(14H,m), 2.02-2.08(1H,m), 2.20(2H,t,J=7.2Hz), 2.88-2.98(1H,m), 2.88(2H,s), 4.80-4.92(2H,m), 4.98(1H,d,J=6.9Hz), 7.50-7.70(2H,m), 7.92-7.98(1H,m), 8.07(1H,d,J=8.4Hz), 8.29(1H,dd,J=1.5&7.5Hz), 8.85(1H,d,J=8.7Hz).

IR(CHCl₃): 3374, 3016, 2946, 2868, 1727, 1506, 1455, 1318, 1160, 1133, 1105, 1051, 984, 890/cm.

$[\alpha]_D^{25} = -89.8 \pm 0.8^\circ$ (CHCl₃, c=1.07, 22°C).

No. 3a-32

CDCl₃ 300MHz

0.80-1.90(14H,m), 1.95-2.05(1H,m), 2.27(2H,t,J=7.2Hz), 2.90-2.98(1H,m), 4.85-5.00(2H,m), 5.23(1H,d,J=6.6Hz), 7.50-7.73(2H,m), 7.95(1H,d,J=8.1Hz), 8.07(1H,d,J=8.4Hz), 8.29(1H,dd,J=1.2&7.5Hz), 8.66(1H,d,J=9.0Hz).

IR(CHCl₃): 3270, 3020, 2948, 2868, 1708, 1455, 1412, 1317, 1189, 1182, 1104, 1079, 1051, 983, 891/cm.

$[\alpha]_D^{25} = -29.2 \pm 0.6^\circ$ (CHCl₃, c=1.06, 22°C).

No. 3a-33

CD₃OD 300MHz

0.84-1.84(14H,m), 1.96-2.08(2H,m), 2.77-2.84(1H,m), 4.67-4.84(2H,m), 7.55-7.75(2H,m), 8.02(1H,d,J=7.5Hz), 8.12-8.28(2H,m), 8.74(1H,d,J=8.7Hz).

IR(KBr): 3482, 3298, 2951, 2872, 1584, 1412, 1315, 1159, 1134, 1107, 1082, 1058, 986/cm.

$[\alpha]_D^{25} = -79.9 \pm 1.2^\circ$ (CH₃OH, c=1.00, 23°C).

No. 3a-34

CDCl₃ 300MHz

0.97-1.91(14H,m), 2.18-2.20(1H,m), 2.42(2H,t,J=7.2Hz), 3.00-3.07(1H,m), 5.06-5.24(2H,m), 5.38(1H,d,J=6.9Hz), 7.57-7.68(2H,m), 7.82-8.00(4H,m), 8.45(1H,d,J=1.2Hz).

IR(CHCl₃): 3260, 3020, 2948, 1708, 1408, 1319, 1154, 1129, 1078, 958, 892/cm.

$[\alpha]_D^{25} = +20.7 \pm 0.6^\circ$ (CHCl₃, c=1.07, 22°C).

No. 3a-35

CD₃OD 300MHz

1.03-2.20(m, 17H), 2.97(m, 1H), 5.02(m, 2H), 7.64(m, 2H), 8.00(m, 4H), 8.48(s, 1H).

IR(KBr): 3380, 3288, 1862, 1407, 1316, 1153, 1130, 1075/cm.

$[\alpha]_D^{25} \approx 0$

$[\alpha]_{488}^{25} = +20.9 \pm 0.6^\circ$ (CH₃OH, c=1.04, 23°C).

No. 3d-1

CDCl₃ 300MHz

0.93-2.55(m, 17H), 3.02(m, 1H), 5.24(m, 2H), 6.48(m, 1H), 7.35-7.60(m, 8H), 7.85-8.00(m, 2H).

IR(나올): 8275, 1548, 1160, 1094, 7 8, 719, 689, 591, 557/cm.

$[\alpha]_D^{25} = +19.0 \pm .6^\circ$ (CH₃OH, c=1.010, 25°C).

원소분석 (C₂₁H₂₃NO₂ 1/2Ca 1.0 H₂O)

계산치: C, 57.94; H, 6.52; N, 3.38; Ca, 4.38; H₂O, 4.35

측정치: C, 57.80; H, 6.88; N, 3.68; Ca, 5.08; H₂O, 4.50

No.3d-6

$[\alpha]_D^{25} = -2.7 \pm .6^\circ$ (CHCl₃, c=1.00, 24°C).

No.3d-7

$[\alpha]_D^{25} = -3.2 \pm 0.4^\circ$ (CHCl₃, c=1.08, 22°C).

mp. 65-67°C

No.3d-8

$[\alpha]_D^{25} = -14.6 \pm 0.5^\circ$ (CHCl₃, c=1.07, 24°C).

No.3d-9

$[\alpha]_D^{25} = +12.2 \pm 0.5^\circ$ (CH₃OH, c=1.00, 23°C).

mp. 119-125°C

No.3d-10

$[\alpha]_D^{25} = +39.7 \pm 0.8^\circ$ (CHCl₃, c=1.07, 22°C).

No.3d-11

$[\alpha]_D^{25} = +29.2 \pm 0.7^\circ$ (CHCl₃, c=1.06, 22°C).

No.3d-12

$[\alpha]_D^{25} = +78.4 \pm 1.1^\circ$ (CH₃OH, c=1.03, 24°C).

No.3d-14

$[\alpha]_D^{25} = -20.6 \pm 0.6^\circ$ (CHCl₃, c=1.07, 22°C).

No.3d-15

$[\alpha]_{me}^{25} = -28.0 \pm 0.7^\circ$ (CH₃OH, c=1.08, 24.5°C).

No.3d-16

$[\alpha]_D^{25} = -8.7 \pm 0.6^\circ$ (CHCl₃, c=1.06, 22°C).

No.3d-17

CDCl₃ 300MHz

0.80-2.15(m, 24H), 2.82(t, J=7Hz, 2H), 3.68(t, J=7Hz, 2H), 3.02(m, 1H), 2.15(m, 24H), 3.82(t, J=7Hz, 2H), 3.68(t, J=7Hz, 2H), 3.02(m, 1H), 5.22(m, 2H), 5.88(d, J=7Hz, 1H), 7.80(A2B2q-A⁺-⁺, J=8Hz, 2H), 7.81(A2B2qB⁺-⁺, J=8Hz, 2H), 9.86(bra, 1H).

$[\alpha]_D^{25} \approx 0$

$[\alpha]_{me}^{25} = -9.7 \pm 0.8^\circ$ (CHCl₃, c=1.08, 22°C).

No.3d-24

$[\alpha]_D^{25} = +19.2 \pm 0.6^\circ$ (CHCl₃, c=1.05, 23°C).

No.3d-28

CD₃OD 300MHz

0.90-2.20(20H, m), 2.88(1H, m), 3.07(2H, q, J=7.0Hz), 5.00-5.40(2H, m), 7.20-7.60(4H, m), 7.98(1H, m).

IR(KBr): 3415, 3254, 1698, 1564, 1514, 1154/cm.

No.3d-29

CD₃OD 300MHz

0.90-2.20(30H,m), 2.78(2H,q,J=7.0Hz), 3.98(1H,m), 5.00-5.30(2H,m), 7.40-7.50(2H,m), 7.60-7.77(2H,m).
IR(KBr): 3435, 3280, 1562, 1328, 1304, 1151/cm.

No.3d-30

원소분석 (C₂₀H₂₃BrNO₄SNa)

계산치: C50.21; H5.27; Br16.70; N2.92; S6.70; Na4.81

측정치: C50.22; H5.40; Br15.57; N2.88; S6.41; Na5.10

IR(KBr): 3425, 3280, 3085, 1697, 1570, 1410, 1321, 1165, 1155/cm.

No.3e-1

CD₂OD 300MHz

0.71(1H,d,J=10.2Hz), 1.04(3H,s), 1.12(3H,s), 1.85-2.28(14H,m),

2.42(3H,s), 3.17-3.25(1H,m), 5.18-

5.39(2H,m), 7.37(2H,d,J=8.4Hz), 7.75(2H,d,J=8.4Hz).

IR(CHCl₃): 3400, 3289, 2986, 2924, 2870, 1559, 1424, 1322, 1305, 1160, 1095, 1075, 1030/cm.

[α]_D²⁵ = +25.9 ± 0.7° (CH₃OH, c=1.00, 23°C).

상기 실시예에서 제조한 화합물을 하기의 실험 실시예에서 제시하는 방법에 따라 생체내 활성 및 시험관내 활성을 시험하였다.

실험 1 PGD₂ 수용체에의 결합

물질 및 방법

(1) 인간 혈소판 막 분획의 제조

3.8% 나트륨 시트레이트를 함유하는 플라스틱 주사기를 사용하여 건강한 자원자(성인 남자 및 여자)의 정맥으로부터 혈액 샘플을 수득하고, 플라스틱 시험관에 담고, 뒤집어서 부드럽게 혼합하였다. 그 다음, 샘플을 실온에서 1800 rpm으로 10분동안 원심분리시키고, PRP(혈소판이 많은 플라즈마; platelet rich plasma)를 함유하는 상층액을 수득하였다. PRP를 실온에서 2300 rpm으로 22분동안 재원심분리시켜 혈소판을 수득하였다. 혈소판을 균질화기 (울트라-투락스(Ultra-Turrax))를 사용하여 균질화시키고, 4°C에서 20,000 rpm으로 10분간 3회 원심분리시켜 혈소판막 분획을 수득하였다. 단백질 측정을 한 후, 막 분획을 2 mg/ml가 되도록 조정하여 사용할 때까지 -80°C의 냉장에서 보존하였다.

(2) PGD₂ 수용체에의 결합

결합-반응 용액(50mM, 트리스(Tris)/HCl, pH 7.4, 5 mM MgCl₂)에 인간 혈소판 막 분획(0.1 mg) 및 5nM [³H]PGD₂(115 Ci/mmol)를 첨가하고, 4°C에서 90분간 반응시켰다. 반응이 완료된 후, 반응 혼합물을 유리 섬유 여과지를 통해 여과하고, 냉각된 식염수로 수 회 세척하고, 여과지에 잔류하는 방사능을 측정하였다. 총 결합에서 비-특이성 결합 (10μM PGD₂의 존재하의 결합)을 빼서 특이성 결합을 계산하였다. 각 화합물의 결합-억제 활성은 결합을 50% 억제하는데 필요한 농도(IC₅₀)로 표현되고, 이것은 화합물의 존재하의 결합 비율(%)을 좌표에 나타내어 치환 곡선을 그려서 결정하며, 이때 시험 화합물의 부재하의 결합비율은 100%이다. 결과를 하기 표에 제시하였다.

화합물 번호	활성 (μM)	화합물 번호	활성 (μM)
3a-4	0.6	2a-4	0.54
1a-115	8.6	2a-17	0.12
1a-28	0.045	2a-21	5.2
1a-47	0.0086	2a-28	0.046
1a-100	0.56	2a-95	1.6
1a-176	0.047	2a-109	0.003
1a-2	0.13	1a-162	0.027

실험 2 인간 혈소판을 사용한 PGD₂ 수용체에 대한 길항 활성 측정

주사기 용적의 1/9를 시트르산/엑스트로즈 용액으로 미리 채운 주사기를 사용하여 건강한 지원자로부터 말초 혈액을 수득하였다. 주사기를 10분 동안 180×g에서 원심 분리시켜 상층액(PRP; 혈소판이 많은 플라즈마)을 수득하였다. 수득한 PRP를 3회 걸쳐 세척용 완충액으로 세척하고, 혈소판의 갯수를 마이크로 세포 계수기(micro cell counter)를 사용하여 계수하였다. 혈소판의 최종 농도가 5×10⁸/ml이도록 조정된 현탁액을 37°C로 가온하고, 그 다음 3-이소부틸-1-메틸크산틴(0.5 mM)으로 5분동안 예비처리하였다. 현탁액에 다양한 농도로 희석시킨 시험화합물을 첨가하였다. 10분 후에, 0.1 내지 2.0 μM의 PGD₂를 첨가함으로써 반

응을 유도하였고, 15분 후에 HCl를 첨가함으로써 반응을 종결시켰다. 초음파 균질화기로 혈소판을 파괴하였다. 원심분리후에, 상청액중의 cAMP를 방사 분석하여 결정하였다. 약제의 PGD 수용체 길항작용을 하기와 같이 측정하였다. PGD₂를 첨가함으로써 증가하는 cAMP에 대한 억제율을 각각의 농도에 대하여 측정한 다음, 50% 억제하는데 필요한 약제의 농도(IC₅₀)를 계산하였다. 결과를 하기 표에 제시하였다.

화합물 번호	인간 혈소판 cAMP의 증가 억제율(IC ₅₀)(μ M)
3a-16	0.37
1a-12	12.11
1a-28	0.30
1a-47	2.09
2a-2	0.77
2a-4	0.94
2a-35	1.52
2a-75	0.71

실험 3 코의 폐색증 모델을 사용한 실험

기니아 피그를 사용하여 코 공동 저항성을 측정하고 코 폐색에 대한 저항성을 측정하는 방법을 하기와 같이 기술하였다.

1% 오발부민(OVA) 용액을 초음파 분무기로 처리하여 에어로졸을 수득하였다. 하틀리(Hartley) 수컷 기니아 피그를 1주일 간격을 두고 10분동안 두번 에어로졸을 흡입시켜 증감시켰다. 증감시키고 7일 후, 기니아 피그를 항원에 노출시켜 반응을 개시시켰다. 그 다음, 펜토바비탈(30mg/kg, 복강내)로 마취시킨 상태에서 기관을 절개하여, 폐 및 코의 공동 측면에서 캐놀라(cannula)를 기관으로 삽입하였다. 폐의 측면에 삽입된 캐놀라를, 4ml의 공기를 60 회/분으로 제공하는 인공 호흡기와 연결시켰다. 가라민(2mg/kg, 정맥내)으로 기니아 피그의 자발적인 호흡을 저지시킨 후, 4ml 공기/회의 유속, 70회/분의 빈도로 인공 호흡기가 달린 관의 주동이에 공기를 공급하였고, 통기에 요구되는 대기압을 분자에 꼭 맞는 변환기를 사용하여 측정하였다. 측정치를 코 공동 저항성의 변수로서 사용하였다. 호흡기 및 코 공동 캐놀라 사이에 3분동안 3% OVA 용액의 에어로졸을 발생시킴으로써 항원에 노출시켰다. 항원에 노출시키기 전에 시험 약제를 10분동안 정맥내 주사하였다. 0 내지 30분 동안 코의 저항성을 연속적으로 측정하였고, 그 효과를 지표로서 30분 동안 AUC를 사용하여 부형제에 대하여 수득한 효과에 대한 억제율로 표시한다(y축 : 코 공동의 저항성 (cm, H₂O), x축 : 시간 (0 내지 30분)). 결과는 하기와 같다.

화합물 번호	억제율(%) 1mg/kg (정맥내)	비고
1a-28	44	
1a-98	69	
1a-100	50	
1a-115	66	
1a-116	48	
1a-120	58	3 mg/kg (정맥내)
1a-2	82	
1a-162	80	
1a-176	60	
1a-267	62	
2a-4	60	
2a-21	52	
2a-28	54	
2a-95	77	
2a-96	77	10 mg/kg (경구)
2a-109	73	
2a-110	66	10 mg/kg (경구)
22a-194	79	

제형에 1 정제의 제조

mg 정제의 성분은 하기와 같다.

칼슘 (+)-(Z)-7-[(1R,2S,3S,4S)-3-벤젠설포나미도비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 이수화물	40.0 mg
하이드록시프로필 셀룰로즈	3.6 mg
마그네슘 스테아레이트	0.4 mg
옥수수전분	18.0 mg
락토즈	58.0 mg
총	120.0 mg

제형에 2 과립의 제조

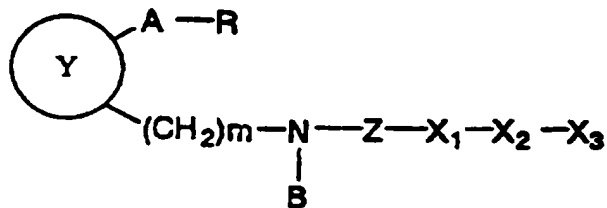
성분은 다음과 같다.

칼슘 (+)-(Z)-7-[(1R,2S,3S,4S)-3-벤젠설포나미도비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 이수화물	100.0 mg
하이드록시프로필 셀룰로즈	30.0 mg
카멜로즈 칼슘	30.0 mg
완석	10.0 mg
폴록사머(Poloxamer) 188	20.0 mg
결정질 셀룰로즈	70.0 mg
옥수수전분	300.0 mg
락토즈	440.0 mg
총	1000.0 mg

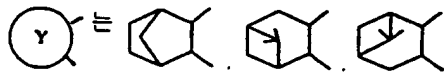
(57) 청구의 범위

청구항 1. 활성 성분으로서 하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물을 포함하는 프로스타글란딘 디2 (PGD₂)길항제:

화학식 I



상기 식에서,



또는 이고,

A는 선택적으로 쇠중에 헤테로 원자 또는 페닐렌을 함유하고, 옥소기를 함유하고/ 함유하거나, 불포화 결합을 갖는 알킬렌이고;

B는 수소, 알킬, 아르알킬 또는 아실이고;

R는 COOR₁, CH₂OR₂ 또는 CON(R₃)R₄이고;

R₁은 수소 또는 알킬이고;

R₂는 수소 또는 알킬이고;

R₃ 및 R₄는 각각 독립적으로 수소, 알킬, 하이드록시 또는 알킬설포닐이고;

X₁은 단일 결합, 페닐렌, 나프틸렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고;

X_2 는 단일 결합, $-N=N-$, $-N=CH-$, $-CH=N-$, $-CH=N-N$, $-CH=N-O-$, $-C=NNHCSNH-$, $-C=NNHCONH-$, $-CH=CH-$, $CH(OH)-$, $-C(C1)=C(C1)-$, $-(CH_2)_n-$, 에틸렌, $-N(R_5)-$, $-N(R_{51})CO-$, $-N(R$

$_{52})SO_2-$, $-N(R_{53})CON(R_{54})-$, $-CON(R_{55})-$, $-SO_2N(R_{56})-$, $-O-$, $-S-$, $-SO-$, $-SO_2-$, $-CO-$, 옥사디아졸디일, 티아디아졸디일 또는 테트라졸디일이고;

X_3 은 알킬, 알켄일, 알킨일, 아릴, 아르알킬, 헤테로사이클릭 기, 사이클로알킬, 사이클로알켄일, 티아졸린일 리덴메틸, 티아졸리딘일리덴메틸, $-CH=NR_6$ 또는 $-N=C(R_7)R_8$ 이고;

R_5 , R_{51} , R_{52} , R_{53} , R_{54} , R_{55} 및 R_{56} 은 각각 수소 또는 알킬이고;

R_6 은 수소, 알킬, 하이드록시, 알콕시, 카바모일옥시, 티오카바모일옥시, 우레이도 또는 티오우레이도이고;

R_7 및 R_8 은 각각 독립적으로 알킬, 알콕시 또는 아릴이고;

n 은 1 또는 2이고;

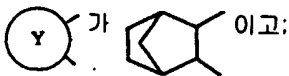
Z 는 $-SO_2-$ 또는 $-CO-$ 이고;

m 은 0 또는 1이며;

이때, 사이클릭 치환체는 니트로, 알콕시, 설파모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알콕시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, $-N=PPh_3$, 옥소, 티옥소, 하이드록시이미노, 알콕시이미노, 페닐 및 알킬렌디옥시로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가질 수도 있다.

청구항 2. 제 1 항에 있어서,

활성 성분이,



m 이 0이고;

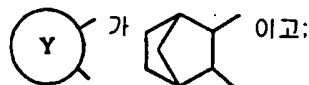
Z 가 SO_2 이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 알킬, 페닐, 나프틸, 스티릴, 퀴놀릴 또는 티엔일인(이들 치환체중의 사이클릭 치환체는 선택적으로 니트로, 알콕시, 치환된- 또는 비치환된-아미노, 할로겐, 알킬 및 하이드록시알킬에서 선택된 1 내지 3개의 치환체를 가짐) 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD₂ 길항제.

청구항 3. 제 1 항에 있어서,

활성 성분이,



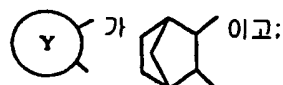
m 이 1이고;

X_1 및 X_2 가 둘다 단일 결합이고;

X_3 이 선택적으로 할로겐으로 치환된 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD₂ 길항제.

청구항 4. 제 1 항에 있어서,

활성 성분이,



m 이 1이고;

X_1 이 페닐이고;

X_2 가 $-CH_2-$ 또는 $-N=N-$ 이고;

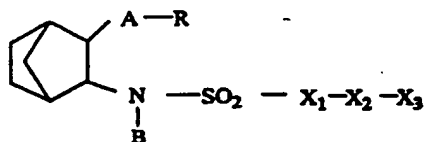
X_3 이 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD₂ 길항제.

청구항 5. 제 1 항에 있어서,

코의 폐색증을 치료하기 위한 약제인 PGD₂ 길항제.

청구항 6. 하기 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물:

화학식 Ia



상기 식에서,

A, B, R, X₁, X₂ 및 X₃은 화학식 Ia에 대하여 정의한 바와 같고,

단, (1) X₁ 및 X₂가 단일 결합이고, X₃이 치환된- 또는 비치환된-페닐 또는 나프틸인 경우와 (2) A가 5-헵텐 일렌이고, R이 COOR₁(이때, R₁은 수소 또는 메틸임)이고, X₁이 1,4-페닐렌이고, X₂가 단일 결합이고, X₃이 페닐인 경우를 제외한다.

청구항 7. 제 6 항에 있어서,

X₁ 및 X₂가 단일 결합이고 X₃이 이속사졸일, 티아디아졸일, 이소티아졸일, 모폴일, 인돌일, 벤조푸릴, 디벤조 푸릴, 디벤조디옥신일, 벤조티엔일, 디벤조티엔일, 카바졸일, 크산텐일, 페난트리딘일, 디벤조옥시펜일, 디벤 조티에핀일, 시놀일, 크로멘일, 벤즈이미다졸일 또는 디하이드로벤조티에핀일이고, A, B 및 R이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 8. 제 6 항에 있어서,

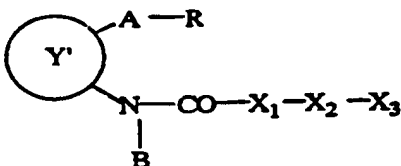
X₁이 단일 결합이고, X₂가 페닐렌이고, X₃이 알켄일, 알킨일, -CH=NR₆ 또는 -N=C(R₇)R₈이고, A, B, R, R₆, R₇ 및 R₈이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 9. 제 6 항에 있어서,

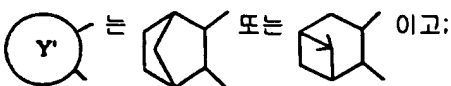
R이 COOR₁이고, X₁이 페닐렌 또는 티오펜디일이고, X₂가 단일 결합, -N=N-, -CH=CH-, -CONH-, -NHCO- 또는 에틴일렌이고, X₃이 페닐, 티아졸리닐리덴메틸, 티아졸리딘일리덴메틸 또는 티엔일이고, A, B, R₁, R₆, R₇ 및 R₈이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 10. 하기 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물:

화학식 Ib



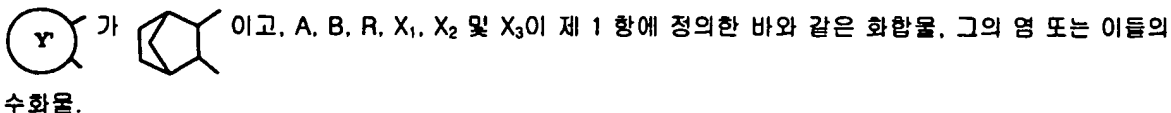
상기 식에서,



A, B, R, X₁, X₂ 및 X₃은 화학식 Ia에 대하여 정의한 바와 같고,

단, X₁ 및 X₂가 단일 결합이고, X₃이 페닐인 경우와 X₁이 단일 결합이고, X₂가 -O-이고, X₃이 벤질인 경우를 제외한다.

청구항 11. 제 10 항에 있어서,



청구항 12. 제 11 항에 있어서,

R이 COOR₁(이때, R₁은 제 1 항에서 정의한 바와 같음)인 화합물, 그의 염 또는 이들의 수화물.

청구항 13. 제 11 항에 있어서,

X₁이 페닐렌 또는 티오펜디일이고, X₂가 단일 결합, -N=N-, -CH=CH-, 에틴일렌, -O-, -S-, -CO-, -CON(R₅₅)- (이때, R₅₅는 제 1 항에서 정의한 바와 같음), -N(R₅₁)CO- (이때, R₅₁은 제 1 항에서 정의한 바와 같음)

음)이고, X_3 이 페닐 또는 티엔일인 화합물, 그의 염 또는 이들의 수화물.

청구항 14. 제 10 항에 있어서,



들의 수화물.

청구항 15. 제 14 항에 있어서,

B가 수소이고, X_1 및 X_2 가 둘다 단일 결합이고, X_3 이 티엔일, 티아졸일, 티아디아졸일, 이소티아졸일, 피롤일, 피리달, 벤조푸릴, 벤즈이미다졸일, 벤조티엔일, 디벤조푸릴, 디벤조티엔일, 퀴놀일 또는 인돌일인 화합물, 그의 염 또는 이들의 수화물.

청구항 16. 제 15 항에 있어서,

X_1 이 페닐렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고, X_2 가 단일 결합, $-N=N-$, $-CH=CH-$, 에틴일렌, $-S-$ 또는 $-O-$ 이고, X_3 이 아릴 또는 헤테로사이클릭 기인 화합물, 그의 염 또는 이들의 수화물.

1944